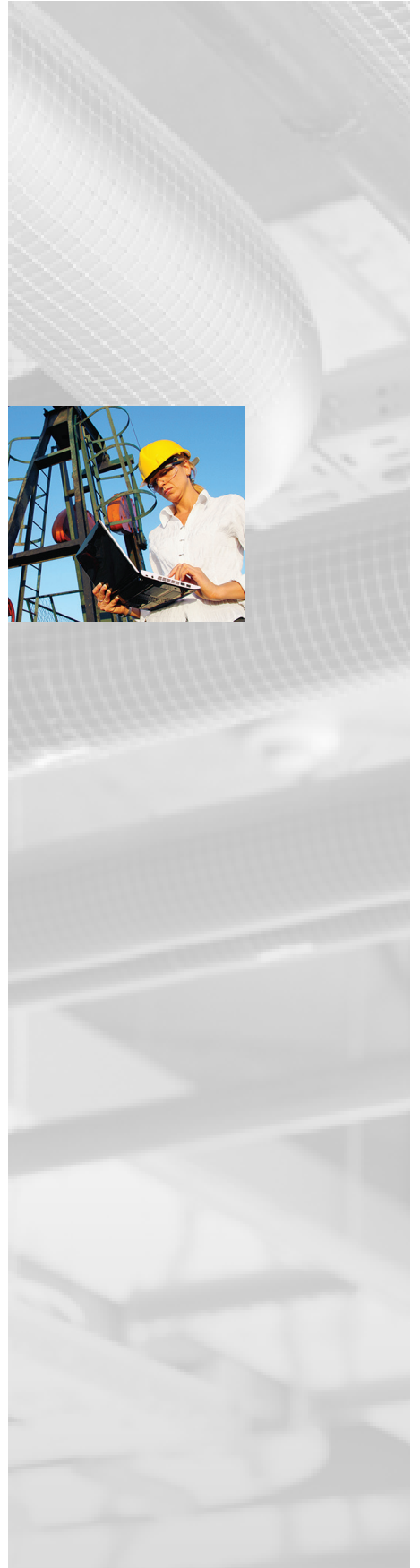


# Proven Oil and Gas Solutions



**Control. Manage. Optimize.**



# Measurable Performance.

In the oil and gas industry, the flow of liquids and gases must be measured during every phase of exploration, production and transportation.

Upstream operations span offshore and onshore activities, including well testing, enhanced oil recovery, fractionation, completion, and separation to recover and prepare crude oil and natural gas. These applications demand the highest flow meter accuracy and reliability, as well as long-term stability and a low cost-of-ownership.

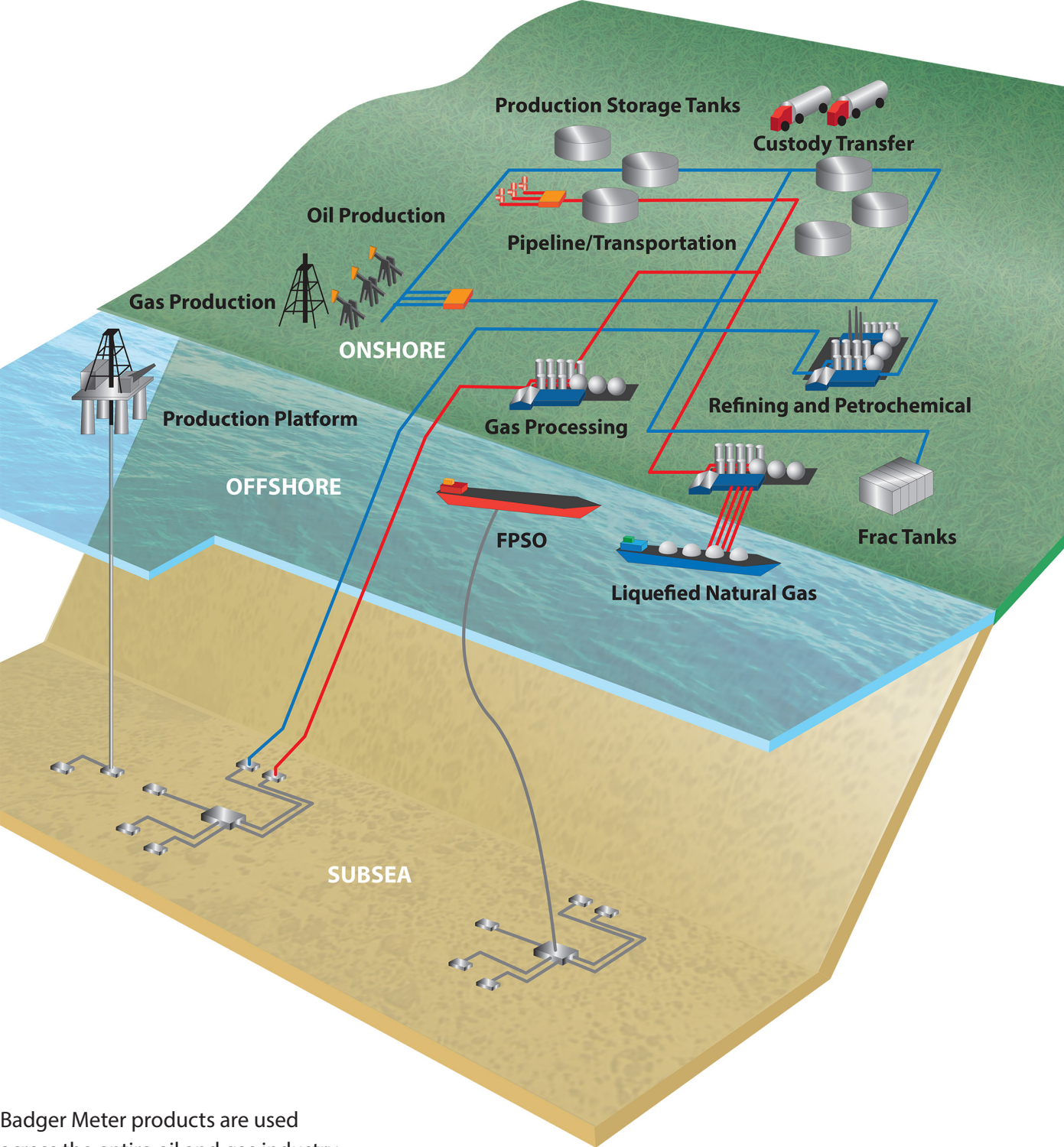
Badger Meter understands companies cannot manage what they cannot measure. A worldwide leader in flow metering technologies, we offer one of the broadest product portfolios for use from the wellhead to the pipeline. This includes respected brand names such as Hedland®, Dynasonics®, Blancett®, Research Control® and more. From electromagnetic, positive displacement, ultrasonic and variable area meters to advanced control valves, our solutions will help you improve the efficiency and productivity of your operations.

## **Badger Meter offers solutions for:**

- Exploration and drilling
- Well operation and production
- Water and wastewater
- Data acquisition and analysis

The Blancett logo features a red square icon with a white stylized sun or gear symbol to the left of the brand name "Blancett" in a bold, red, sans-serif font.The Coriolis logo features a red square icon with a white stylized wave or flow symbol to the left of the brand name "Coriolis" in a bold, red, sans-serif font.The Dynasonics logo features a red square icon with a white stylized wave or flow symbol to the left of the brand name "Dynasonics" in a bold, red, sans-serif font.The Flow Dynamics logo features a red square icon with a white stylized wave or flow symbol to the left of the brand name "Flow Dynamics" in a bold, red, sans-serif font.The Hedland logo features a red square icon with a white stylized wave or flow symbol to the left of the brand name "Hedland" in a bold, red, sans-serif font.The ModMAG logo features a red square icon with a white stylized wave or flow symbol to the left of the brand name "ModMAG" in a bold, red, sans-serif font.The Oval Gear logo features a red square icon with a white stylized gear or oval symbol to the left of the brand name "Oval Gear" in a bold, red, sans-serif font.The Preso logo features a red square icon with a white stylized wave or flow symbol to the left of the brand name "Preso" in a bold, red, sans-serif font.The RCV logo features a red square icon with a white stylized wave or flow symbol to the left of the brand name "RCV" in a bold, red, sans-serif font.The Vortex logo features a red square icon with a white stylized wave or flow symbol to the left of the brand name "Vortex" in a bold, red, sans-serif font.

# Application Environment



Badger Meter products are used across the entire oil and gas industry, providing solutions for the most demanding exploration and drilling, well operation and production, and water and wastewater applications.



# Exploration & Drilling

Flow measurement is critical throughout the upstream oil and gas sector. During the exploration and drilling stages at oil and gas fields, however, accurate and dependable flow metering instrumentation is essential to ensure production is optimized.

When a shale gas reserve has been found, the first stage of the extraction process is to pump water-based solutions into the well to release the trapped gas. Badger Meter ModMAG M-Series® electromagnetic flow meters are ideal for this application because of their compatibility with conductive liquids. Additionally, Vortex gas insertion and wafer meters or Preso® Gemini meters can be used to measure the extracted gas.

Measurement of mudflow is another important task at well sites. Non-intrusive Dynasonics ultrasonic meters perform efficient measurement of mudflow system return lines when the drilling mud contains beads which are good reflectors for Doppler ultrasound. And Preso COIN meters measure drilling mud that lacks reflective beads. You can also rely on Hedland variable area meters to verify the outputs of hydraulic-driven equipment such as power units on drilling rigs, and to monitor test machinery and tools for proper fluid flow rates.



## Applications:

- Reservoir assessment
- Well performance testing
- Extraction processes
- Mudflow measurement
- Hydraulic power units



# Well Operation & Production

Well monitoring and production optimization demand superior flow measurement technologies. For example, Badger Meter Industrial Oval Gear (IOG) meters, along with Research Control Valve (RCV) products, are the right solutions for water and chemical injection on oil and gas wells. Preso COIN meters are used for CO<sub>2</sub> injection on enhanced oil recovery (EOR) skids. They are also suitable for fuel gas to flare and acid gas measurements, as well as liquefied natural gas (LNG) processing, transportation and storage.

Separators for well testing and production measurement, including those used for bitumen in oil sands operations, require precision instruments like a Blancett turbine meter paired with a field monitor to measure water-based fluids. Meanwhile, Preso COIN meters are used to measure oil sands, bitumen and other viscous petroleum fluids. When it comes to fly ash leachate and other slurries, Dynasonics ultrasonic meters are the best option.

Badger Meter vortex gas meters and RCV valves are used on flare and venting systems. RCV solutions help maintain the nitrogen blanket within a pressure vessel, and valve positioners can be paired with pneumatically operated valves for monitoring fugitive emissions. The Blancett gas turbine meter is also used in flare gas applications as well as for measuring compressor gas consumption.

Badger Meter also supports customers in reducing costs and increasing production from shale gas plays. Here, too, Blancett turbine meters are chosen for crucial applications measuring process water injected into and recovered from wellheads to keep fracking formations pressurized or to help scrub remaining oil out of older wells. Our ModMAG mag meters reliably measure abrasive discharge fluid pumped to and from wells and are robust enough to withstand operational vibration on truck-mounted, process water blending units.



## Applications:

- Wellhead measurement
- Multi-stage separators
- Water & chemical injections
- Hydraulic fracturing
- Frac blending trucks
- Flare gas feed lines
- Venting systems
- Wellhead tank storage
- Fluid loss & leak detection



# Water & Wastewater

Tighter environmental regulations mean water discharges produced at oil and gas facilities can no longer simply be regarded as a waste stream. Both the quality and quantity of these streams must be monitored.

When your wastewater treatment processes depend on accurate measurement, monitoring and control technology, count on the Badger Meter ModMAG electromagnetic flow meter. This is the right meter for process water, wastewater and ground water consumption applications. The ModMAG is designed to achieve  $\pm 0.25$  percent accuracy. In addition, the non-intrusive, completely open flow tube design virtually eliminates pressure loss. And with no moving parts to impede the flow stream, maintenance is kept to a minimum — even in less than ideal fluid conditions.

Our Dynasonics portable, clamp-on ultrasonic flow meters also have a wide variety of applications involving process water and wastewater. They are an excellent choice for measuring flows to verify sensor, pump and valve performance.



## Applications:

- Water quality
- Wastewater treatment
- Groundwater consumption
- System verification





# Communication Solutions

Badger Meter offers a complete portfolio of connectivity and communications solutions to allow greater application flexibility and easier system implementation on exploration and production (E&P) projects. From batch controllers, digital displays and calculators, to adapters for today's most common industrial networks and advanced data management systems, we deliver the tools to make adjustments in real-time and collect valuable operational data.

## The Right Choice

Badger Meter's proven technology and superior reputation in flow measurement and control have stood the test of time. Our precision control valves and diverse family of flow meters continue to play a valuable role in solutions for the oil and gas industry. Our solutions allow you to nurture your processes by way of maximizing your flow control efficiency and accuracy with confidence.



# Flow Dynamics® Services

Flow Dynamics is a major, independent primary standard flow calibration laboratory, supplying both manufacturers and end users with unparalleled calibration results. We are trusted to calibrate precision oil and gas instrumentation to ensure optimum flow measurement and control.

## What we provide:

- Calibration and repair of most types of flow meters
- Multiple viscosity liquid calibrations using Strouhal-Roshko analysis
- Calibration history files for future comparisons
- Research and development testing for flow measurement devices
- Variety of inert gas calibrations
- Correlation and extrapolation methods simulating hazardous fluids
- Electronic calibrations for flow computers and signal conditioners
- OEM production calibration service
- NIST-traceable calibrations



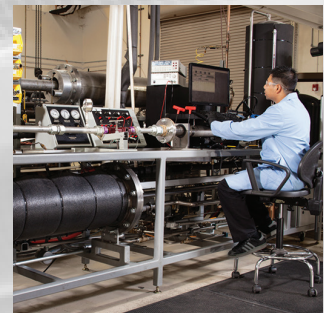
FM 78587  
AS9100 Rev. C and  
ISO 9001:2008

## Quick Calibration Service:

Seven day turns or less for single viscosity calibrations, without expedite fees. On-site and field calibration services available.



- Calibration for most types
- OEM production calibrations
- NIST-traceable primary standards
- NVLAP (Code 200668-0) accredited\*



\* NVLAP accreditation applies only to the Badger Meter Flow Dynamics calibration Lab, located in Racine, WI.

## Control. Manage. Optimize.

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