

TASi Flow Expertise



**The Experts in Oil and
Gas Flow Measurement**

The Experts in Oil and Gas Flow Measurement

TASI Flow Group offers more than 25 years of experience in the oil and gas industry. Our high quality, highly accurate and reliable instruments meet customer requirements both in up and downstream applications worldwide. From corrosive subsea environments, upstream on or offshore production, terminals or downstream refineries we are able to provide best-customized flow measurement equipment. Difficult flow metering challenges like high-pressure ratings, pulsating flow streams, corrosive media and harsh environment conditions are our daily business.

During oil and natural gas exploration, oil companies are looking for solutions with focus on:

- System Reliability
- Reduced Chemical Costs
- Increased Efficiency
- Long-term Durability
- Customized Design

The TASI Flow Group members AW-Lake Company, KEM Kùppers Elektromechanik GmbH, Litre Meter Ltd. and SignalFire Wireless Telemetry are valued for their excellent quality and superior accuracy measurement equipment.

Our products withstand the harshest conditions in the most remote locations on earth. We are committed to providing the highest standards of reliability and service at every stage throughout the product lifecycle. We are consistently improving our product portfolio to fit oil and gas customers' requirements globally.

Crude oil and natural gas are used worldwide and both are still crucially important and indispensable energy sources. The exploration of the corresponding energy deposits at great depths is a demanding challenge. Profound knowledge and understanding of the costumers' processes as well as close collaboration are not only our strengths, but our key success factors. That approach forms the foundation of our flow measurement platform offering product variety, flexibility and customized solutions.

Our products are used in these applications:

Well Injection

Chemical Injection

Gas Dehydration and De-Icing

Wireless Measurement

Well Control

Topside

Subsea

Onshore

Well Performance

Waterflooding

Hydraulic Fracturing

Wellhead Monitoring

Pump Performance Monitoring

Transmission & Storage

Drag Reducing Agent

Gas Odorization

Level Monitoring

Chemical & Petrochemical

Loading and Storage

Gas Sweetening

Blending

TASi Flow Expertise



Typical Oil and Gas Applications for Our Flow Metering Systems

Well Injection

Chemical Injection is utilized for maintaining flow, reducing corrosion, scaling and improving oil-water treatment operations. Various costly chemicals are injected into the crude oil to provide a degree of protection and improve production.

Our **Gear Flow Meter** is able to cope with the pulsing nature of the pumps and is standardized in mid-pressure oil fields. Our **Rotary Piston Flow Meter** has extraordinary high-pressure capability up to 4,200 bar (60,000 psi) and outstanding low flow rate performance. The latest of our **TRICOR® Coriolis Mass Flow Meter** can meet the challenge of high pressures up to 1,050 bar (15,200 psi) – an enormous advancement and a cutting-edge rating compared to common design pressures.

Gas Dehydration and *De-icing* through glycol and methanol have to be measured and controlled to inhibit hydrate formation or slugging in flow lines. Our **Turbine Flow Meter** with high-pressure flange, hub or threaded connection varieties are widely used to ensure a reliable and accurate flow measurement. The biggest challenge is to avoid costly downtime due to freeze-ups in deep-water well systems. Oil companies trust our reliable, accurate and high resolution flow sensing solution for low and high viscosity liquids at pressures of 1,400 bar (20,300 psi) or even higher.

Even as *Wireless Measurement* becomes the norm, operators sometimes need the option for a local display. The **Flow Totalizer** integrates with inductive flow meters to measure, locally display, wirelessly transmit and archive flow measurements. Data and diagnostics are available locally using a display as well as remotely on a PC, PLC or other control systems. The Flow Meter allows operators to check flow rates or totals locally in addition to tracking data in a SCADA system. For example, a local technician can use the **Flow Totalizer** when offloading a tank to measure before/after totals of pumped fluid. Using an external pushbutton, workers can cycle through a backlit LCD to get appropriate readings for flow and total.



Gear Flow Meter

Direct Volume Measurement
High Resolution Medium Pressures



Rotary Piston Flow Meter

Direct Volume Measurement
Low Flow Rate Capability
High Pressures
Low Pressure Drop



SignalFire Wireless Telemetry

Remote flow monitoring & control
Wireless data management capabilities
Operates in challenging outdoor environments



Turbine Flow Meter

Direct Volume Measurement
Variable Process Connections
Fast Response Time



Offshore Well Control

In offshore drilling, blowout preventers (BOP) are installed to guard the process from extremely sporadic pressures and uncontrolled flow ('formation kick') emanating from a well reservoir. They are placed at the well opening and consist of a set of hydraulically-operated valves or rams, which are used to safely shut-in the well.

In this application our **Turbine Flow Meter** is used for precise flow measurement of hydraulic fluid during activation of the BOP on the sea floor. Our **Gear Flow Meter**, for instance, monitors flow on the surface at the hydraulic power unit (*Topside*). Valve actuators, installed on subsea trees or manifolds, are driven by control pods. They supply hydraulic fluid, which activates valves at well heads on the ocean floor (*Subsea*). The outstanding repeatability and accuracy of our instruments enable customers to compare a baseline to verify valve position.

A remotely operated vehicle (ROV) is an electrical tethered underwater mobile device. A hydraulic pump is used for propulsion and to power equipment such as torque tools and manipulator arms. Our subsea **Turbine Flow Meter** has high shock and vibration resistance and can withstand internal pressure up to 10,000 psi and external pressures up to 6,000 psi. The instant transmission of data can immediately detect leakage within hydraulic systems. So the need to raise wellhead equipment to the surface is minimized.



Gear Flow Meter

- Direct Volume Measurement
- Wide Turndown
- High Resolution
- Bi-Directional Measurement



Turbine Flow Meter

- Direct Volume Measurement
- High Shock and Vibration Resistance
- Subsea Immersion

Onshore Well Control

In challenging environments such as *onshore* oil fields, our **Remote Shutdown System** eliminates the need to visit the site to shut down equipment. For instance, when a tank collecting oil or water from several wells becomes full, the Remote Shutdown System can stop wells from operating to prevent spillage. Because of an oil-field layout, the decision to shut-in a well is often made far away from the actual wells. The Remote Shutdown System is configurable to offload data to a PLC or a PLC-controlled system.

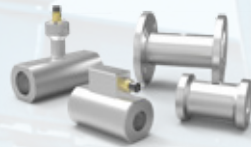
Understanding the operational status of pump jacks at any given time is essential to maintain oil field productivity. The **Tilt Scout** is an intrinsically-safe, wireless inclinometer sensor that monitors a pump jack's cyclical up-and-down motion and reports on/off events. With feedback from the wireless sensor, workers can determine if a pump jack is idle to can take immediate corrective action to ensure proper operations.

When oil is extracted from a well, any gas is separated from the oil and either routed to a pipeline or flared at the site. EPA regulations require a 5% measurement accuracy of flare gas. The Totalizer Module from SignalFire works with analog or digital flow meters to provide instantaneous, total, and daily flow information of gas. Data is accessible wirelessly or locally over a RS-485 Modbus RTU connection.



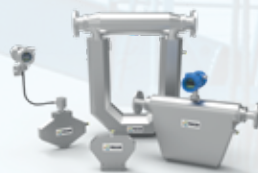
SignalFire Wireless Telemetry

- Remote and wireless tank shutdown
- Pump jack status monitoring
- Well flare gas monitoring



Turbine Flow Meter

- Direct Volume Measurement
- Material Flexibility
- High Pressures
- Wide Dynamic Range



TRICOR® Coriolis Mass Flow Meter

- Mass Flow Measurement
- High Density Accuracy
- Net Oil Computing
- Fast Response Time



SignalFire Wireless Telemetry

- Remote pump monitoring
- Data access by local, WI-FI or cellular networks
- Battery-powered operations

Well Performance

Produced water is a term used in the oil industry to describe water that is produced as a byproduct along with the crude oil and natural gas. To achieve maximum oil recovery, *Waterflooding* is often implemented, in which water is injected into the reservoirs to help force oil out of the production wells. We established our brand in this application through high rated material and process connection flexibility, as well as the ability to design to high pressures with **Turbine Flow Meters**.

Hydraulic Fracturing ('fracking') is a well stimulation technique in which rock is fractured by a pressurized liquid. The process involves the high-pressure injection of 'fracking fluid' into a wellbore to create cracks in the deep rock formations through which natural gas, petroleum and brine will flow more freely. When the hydraulic pressure is removed from the well, small grains of hydraulic fracturing hold the fractures open.

Our **TRICOR® Coriolis Mass Flow Meter** is used at a later stage in the process to analyze the water and oil ratio (*Wellhead Monitoring*). To ensure our customers' growth and a stronger, more efficient and more competitive production we follow and support their innovative technologies for treating resources in a sustainable and environmentally friendly manner.

Using a **SignalFire Remote Sensing System**, operators can remotely monitor the status of pump operations (*Pump Performance Monitoring*). In a water distribution system, for instance, **Pressure Scouts** mounted on both the suction and discharge of the pumps provide output signals to a **Gateway** that stores readings in a network in Modbus format. An Ethernet interface module connects the Gateway to a local area network, a WI-FI network, or a cellular modem, bringing the information to laptops or smartphones.

Transmission

We supply our instruments to skid mounted process equipment design and manufacturing companies to support transmission of hydrocarbon. *Drag Reducing Agents (DRA)* can be broadly classified under the four categories: polymers, solid-particle suspensions, biological additives and surfactants. These agents consist of high molecular weight polymers or micellar systems. The polymers help with drag reduction by decreasing turbulence in the oil lines. When the polymer is added, it interacts with the oil to help reduce the contact of the oil with the wall. This allows lower oil pump pressures and therefore produces savings in energy and money. Our **TRICOR® Coriolis Mass Flow Meter** maintains the fluid properties of the dosed polymers providing optimal production conditions.

Natural gases are odorless but potentially dangerous so this is why these gases are treated with a strong smelling substance. To detect leakage in natural gas transmissions *Gas Odorization* is enormously important. For that purpose, we offer **Gear Flow Meters** for odorizing Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG) within the complete transport chain. In addition, with odorant injection instrumentation, our customers are able to provide the indispensable tools to accurately dose and measure natural gas streams throughout various stages of production, transmission and distribution.

Storage

In wireless Tank Level Monitoring, the **SignalFire Remote Sensing System** features an open architecture mesh network that provides many benefits over competitive technologies including choice of sensors, wireless capacity, and easy configuration. A battery-powered HART supply power to the level sensors installed on the tops of tanks eliminating the need for line power. Data is transmitted to a Gateway that delivers the information in various formats such as 4-20mA, Modbus, and HART protocols. Gateways can accommodate thousands of nodes in a network, covering very large geographic ranges.

Storage tanks found in oil field tank farms have hatches that provide workers access inside the tanks to take samples, monitor levels, or perform maintenance. When ajar, tank hatches, can release vapors into the atmosphere creating an immediate hazardous condition or a longer-term environmental situation. The C1D1-certified **Tilt Scout** helps mitigate environmental and safety risks associated with accidental emissions from tanks by monitoring the angle of the hatch to determine if it is open, closed, or partially open, allowing operator to quickly respond to avoid hazardous emissions.

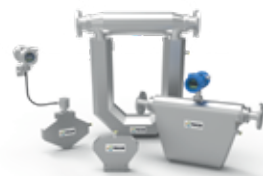


SignalFire Wireless Telemetry

Remote tank level monitoring and control

Wireless tank hatch monitoring

Programmable to alarm operators on conditions



TRICOR® Coriolis Mass Flow Meter

Mass Flow Measurement

Customer Tailored

Fluid Property Protection

Drainable Tube Design



Gear Flow Meter

Direct Volume Measurement

High Resolution

Low Viscous Fluid Measurement

Chemical & Petrochemical

The downstream sector commonly refers to the refining of petroleum crude oil as well as processing and purifying of raw natural gas. The deep-sea tankers represent the link between loading ports and land. **TRICOR® Coriolis Mass Flow Meter** are commonly used to measure petrochemical products, for instance, LPG with high commercial value is offloaded with reliability and accurate performance in *Loading and Storage* processes.

Hydrogen sulfide (H₂S) scavengers are widely used in hydrocarbon and chemical processing facilities. These specialized chemicals react selectively with and remove H₂S to help meet product and process specifications. The process of removing H₂S is known as *Gas Sweetening*. Regarding flow rates, operating pressures and their accuracy our **Rotary Piston Flow Meters** and **Gear Flow Meters** often exceed customers' expectations in direct volumetric measurement.

The *Blending* of gasoline, distillates, jet fuel and kerosene needs an injection of proportionate amounts of different liquid hydrocarbons into the main stream where turbulence promotes thorough mixing. The **Turbine Flow Meter** is particularly suitable for *Blending* tasks: Fast response time combined with various on-site evaluation devices ensure a quick process control.



TRICOR® Coriolis Mass Flow Meter

Mass Flow Measurement
Excellent Sensitivity
Precise Batch Operations
With Entrained Gases



Rotary Piston Flow Meter

Direct Volume Measurement
Low Flow Rate Capability
Robust Wetted-Parts Material



Gear Flow Meter

Direct Volume Measurement
High Resolution
Exceptional Repeatability



Turbine Flow Meter

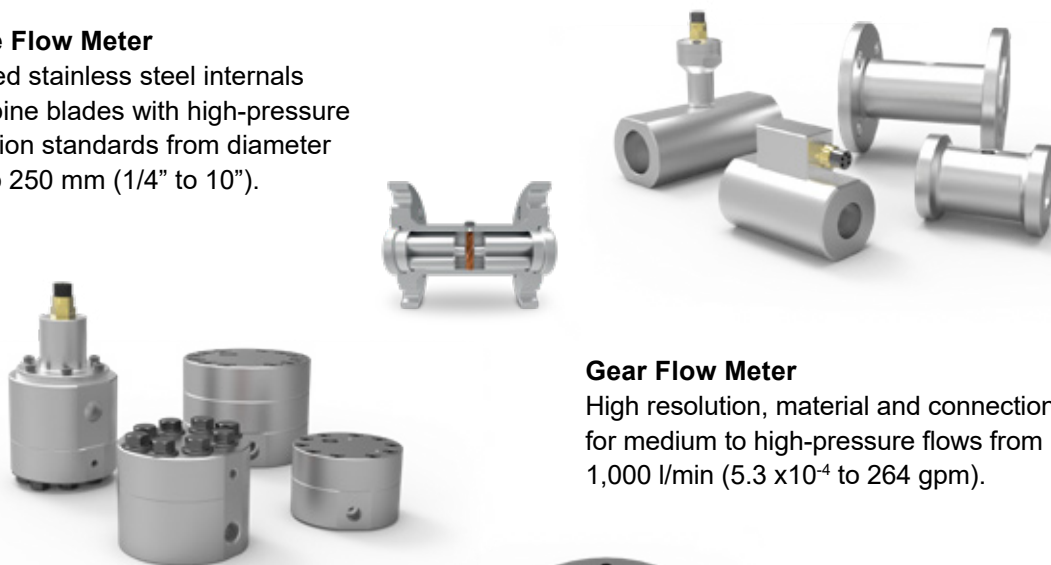
Direct Volume Measurement
Installation Space Saving
High Pressures



Product Overview

Turbine Flow Meter

Machined stainless steel internals and turbine blades with high-pressure connection standards from diameter 8 mm to 250 mm (1/4" to 10").



Gear Flow Meter

High resolution, material and connection flexibility for medium to high-pressure flows from 120 ml/h to 1,000 l/min (5.3×10^{-4} to 264 gpm).



Rotary Piston Flow Meter

Unique titanium rotor design combined with high pressure, material and connection flexibility for flow rates from 3 ml/h to 270 l/min (1.32×10^{-5} to 71 gpm) and higher.



TRICOR® Coriolis Mass Flow Meter

Parallel stainless steel state-of-the-art tube design with high mass and density accuracy including ATEX, IEC Ex and CSA certified evaluation electronic.



SignalFire Wireless Telemetry

Products offer remote asset monitoring and control solutions for challenging environments.

TASI Flow Group's high flexibility through in-house development and production ensures an extraordinary process optimization with unique customer-orientated measurement solutions.



www.aw-lake.com

AW-Lake is the sales and marketing arm of TASI Flow in the US. The company provides local engineering solutions, manufacturing and final assembly, calibration and customized flow metering solutions to customers in North, South and Central America.



Küppers Elektromechanik GmbH

www.kem-kueppers.com

KEM Küppers Elektromechanik GmbH is a German manufacturer with 50 Years of experience for customized flow solutions. The in-house DAkkS certified calibration of flow meters offers an improved accuracy of 0.05 % for mass flow (DIN EN ISO/IEC 17025:2005).



www.litremeter.com

Litre Meter Ltd. is a UK manufacturer of Rotary Piston Flow Meters dedicated to the challenging chemical injection industry. The company has 40 years' experience supplying chemical injection flow meters to deep-water oil explorations worldwide.



www.signal-fire.com

SignalFire Wireless Telemetry designs and manufactures wireless telemetry products that enable robust, long-distance wireless communication connecting multiple devices in challenging outdoor environments.

TASi Flow Expertise

A Strong Global Flow Solution Network

The **TASi** Group of Companies is comprised of three technologically advanced strategic business segments commonly linked by a disciplined focus on Test, Inspection and Flow Measurement.

TASi Flow products are designed, developed, customized and serviced through technical centers in the US, China, Switzerland, Germany

and UK. Strategically located calibration centers in Europe, Asia and the US allow us to provide full service and application expertise next to the customers door.

Take advantage of our strong **Global Flow Solution Network** with competence in a diverse lineup of flow measurement technologies.



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