

TASi Flow Expertise



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

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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 Küppers Elektromechanik GmbH and Litre Meter Ltd. 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
De-Icing

Well Control

Topside
Subsea

Well Performance

Waterflooding
Wellhead Monitoring

Transmission

Drag Reducing Agent
Gas Odorization

Chemical & Petrochemical

Loading and Storage
Gas Sweetening
Blending



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 water based mixtures. These liquids aim to prevent 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.



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



TRICOR® Coriolis Mass Flow Meter
Mass Flow Measurement
Immunity to Medium, Process and Environmental Influences
High Pressures



Turbine Flow Meter
Direct Volume Measurement
Variable Process Connections
Fast Response Time



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 sensing of hydraulic fluid flow 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 accurate measurement data of our instruments enable customers to compare a baseline to verify the 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 tailor-made **Turbine Flow Meter** for subsea immersion has high shock and vibration resistance and demonstrates our expertise for critical and complex flow measurement tasks as well as our knowledge about challenging external environment conditions on the seabed. The most important benefit of our measurement technology is the instant transmission of data that can be interpreted quickly. In this way, immediate detection of leakage within hydraulic systems is possible. So the need to raise wellhead equipment to the surface is minimized.



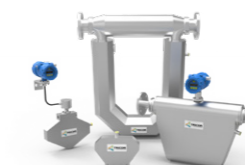
Gear Flow Meter
 Direct Volume Measurement
 Wide Turndown
 High Resolution
 Bi-Directional Measurement



Turbine Flow Meter
 Direct Volume Measurement
 High Shock and Vibration Resistance
 Subsea Immersion



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

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.

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.



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
 Compact Design
 Precise Batch Operations
 With Entrained Gases

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

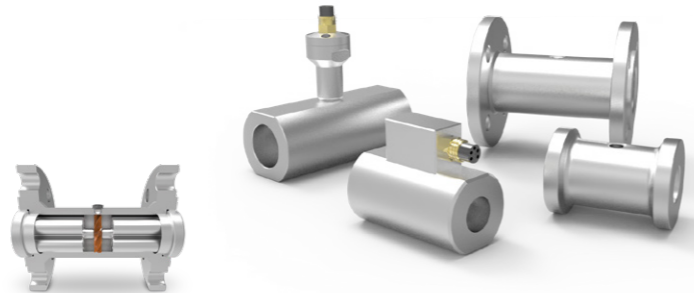
Gear Flow Meter
 Direct Volume Measurement
 High Resolution
 Exceptional Repeatability

Turbine Flow Meter
 Direct Volume Measurement
 Installation Space Saving
 High Pressures
 Fast Response Time

Product overview

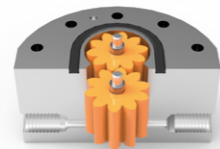
Turbine Flow Meter

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 x10⁻⁴ to 264 gpm).



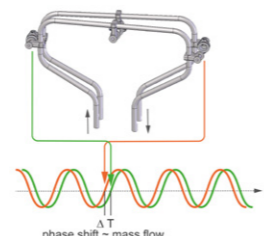
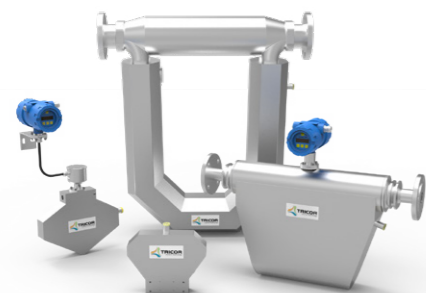
Rotary Piston Flow Meter

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 x10⁻⁵ 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.



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



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.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.



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.

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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