

Measurement & Analytics

## VIS Multiphase Flow Meter

High gas content applications solved with  
no radioactive source - Measurement  
made easy

Power and productivity  
for a better world™



# ABB's VIS Multiphase Flow Meter

## Easy to operate, accurate and field-proven

Thanks to a partnership with TEA Sistemi, ABB is proud to provide VIS (Vega Isokinetic Sampling), a high-performing yet compact meter, able to successfully manage the most challenging multiphase stream conditions.

### Multiphase flow metering for upstream applications

Providing accurate, real-time production rates is crucial for well assessment and management in the oil and gas upstream sector.

ABB VIS is the ideal solution for monitoring the flow rates of produced oil, gas and water close to the wellhead.

VIS provides the same accuracy of conventional test separators in a product-sized-free device.

Multiphase flow metering near production wells has become a key requirement for the oil and gas sector, removing the need for test separators, large vessels where the different phases are separated (mainly by gravity) and then measured through standard single-phase techniques. Conventional test separators are expensive, introduce delays due to the relevant processing times and have a large footprint that is especially troublesome in off-shore production sites.

Multiphase flow meters (MPFM) can provide the same information and metering accuracy of test separators in a small-sized product with no time delay and a much lower investment cost.

ABB's VIS is the new generation of MPFM tailored for wet gas applications and able to provide outstanding accuracy in the most challenging operating regions. When the gas content fraction is very high, VIS performance is superior. As the gas void fraction (GVF) increases above 99.5% VIS accuracy remains very high and even tends to improve, providing the most reliable solution for these applications.

VIS is designed to meet the most demanding requirements of the oil and gas sector and provides optimal performance for:

- Well testing
- Production monitoring
- Production allocation
- Reservoir management



## Applications

### Upstream oil and gas:

- Production well testing
- Exploration well testing
- Production allocation
- Hydrate control
- Formation water monitoring
- Real-time reservoir management

### Underground gas storage fields:

- Bi-directional measurements
- Water-in gas minimization

## Features

- Radioactive-free
- Continuous, real-time measurement
- Based on conventional instrumentation
- Compact size
- 80 – 100% GVF operating range
- Self-calibrating
- Proprietary software
- Field mounted or remote (e.g control room) user interface



# VIS – High technology and global coverage at your disposal

The isokinetic sampling method allows the withdrawal of a small representative portion of the main stream and the separation into the different phases guaranteeing an absolute accuracy of the flow rate measurements.

ABB global coverage always provides you with a local interface and timely support.

VIS (VEGA Isokinetic Sampling) is the ideal metering solution for high demanding wet gas applications as it allows the measurement of three different phases at the same time with unmatched accuracy.

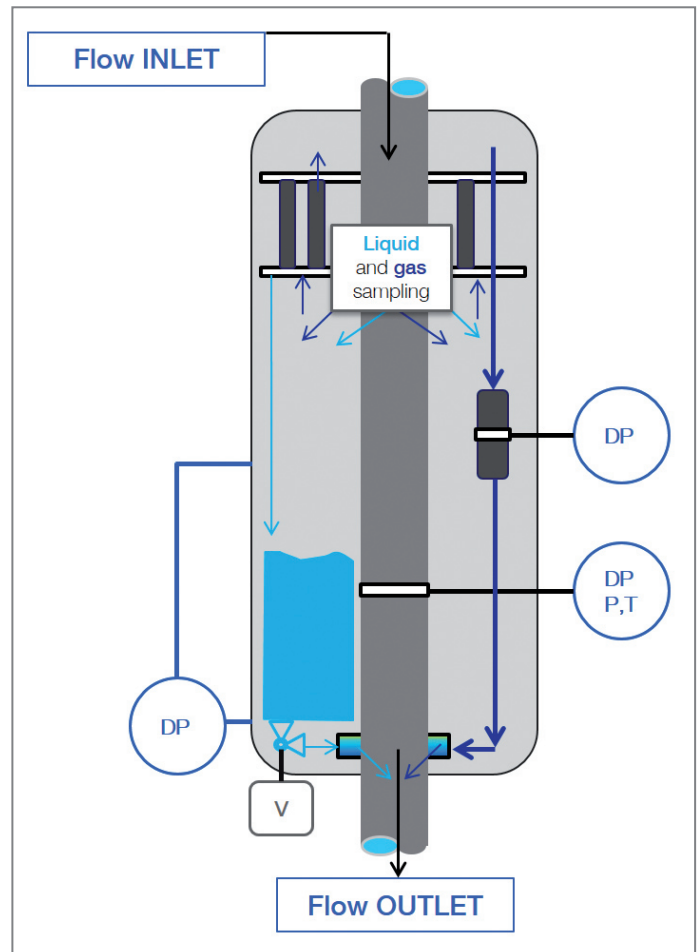
VIS is designed to operate in all kinds of wet gas fields where the GVF is above 80%, and its performance is not affected even by the most challenging conditions. When the gas content rises above 98%, VIS is the only solution able to measure all the three phases with optimal accuracy.

VIS' operating principle is based upon isokinetic sampling of the gas-liquid mixture. The sample is usually about 10% of the total flowrate and is taken at a position in the meter where the gas and liquid velocity profiles are uniform. The mixture is separated within the body of the meter, through an extremely compact and efficient gas-liquid separator whose volume is about 5% of a conventional well testing system. Once separated the individual phases are measured and then re-injected in the main flow line.

The total flowrates are then calculated by multiplying the single phase readings related to the sampled stream by the sampling factor.

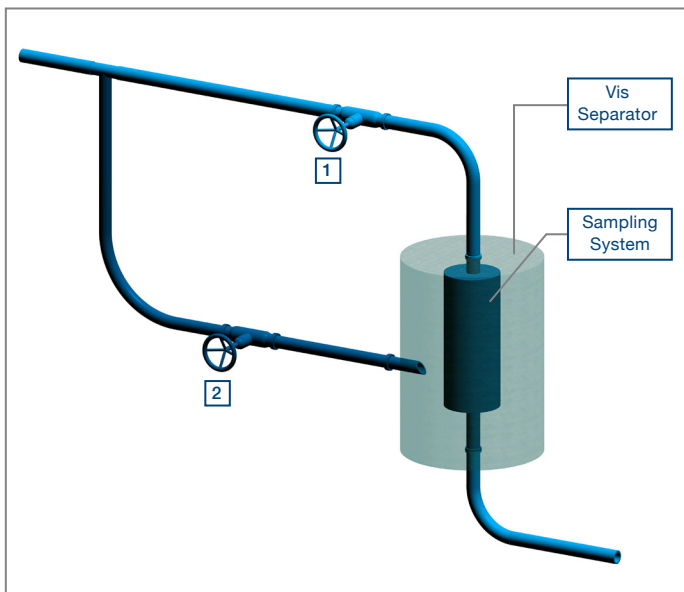
VIS is also perfectly suited for two-phase applications: in this case, a simplified configuration can be provided minimizing system complexity and final cost.

Gas storage fields represent an additional key application area for VIS. Thanks to its unique design, VIS can provide bi-directional measurements, replacing the standard orifice plate used to measure dry gas injected at the manifold and providing also a very accurate real-time measurement of dual phase fluids during the extraction. This is very beneficial since it allows to optimize the extraction from the storage reservoir, minimizing the water content in the gas.



## Dual Inlet

Unique feature, turndown expanded up to 100:1 with the same accuracy



VIS exclusive technology enables you to greatly extend the meter's turndown. With the "Dual Inlet" option, a meter designed to operate at a given flowrate (say  $X \text{ m}^3/\text{h}$ ) can be easily used at  $1/10$  of the design flowrate ( $X/10 \text{ m}^3/\text{h}$ ) with the same accuracy and no component replacement. In fact, with Valve 1 open (and Valve 2 closed) VIS operates according to its design spec (nominal flowrate), with the stream entering into the sampling system, providing the measurement on the selected sample and reconstructing the actual flows through the sampling factor. When the flow is just a fraction of the nominal value, it is sent through Valve 2 directly into the separator (dark blue line) and the flow computer skips the sampling factor multiplication since the single phase measurements provide the actual flowrates.

This feature is extremely important in the case of MPFMs monitoring several wells with very different production rates. Sometimes this can result in consistent savings as a single VIS can do the same job of two different meters. Additionally VIS can adapt to the aging of wells, without the need of major component replacement. Whatever the case, VIS is the best option to protect your investment!

Multiphase flow metering is a perfect addition to ABB's existing portfolio of solutions in oil and gas automation and instrumentation, giving you the possibility to interface with local experts able to address any request and to provide all the support you need.

ABB's global service network provides you with local support and expertise.

# Technical details

VIS is tailored to specific project needs: customizable configurations can be designed according to process requirements

<b>Important information at a glance</b>	
Operating envelope	80-100% Gas volume fraction
Accuracy for liquid flow rate	±3% of reading
Accuracy for gas flow rate	±3% of reading
Accuracy for water flow rate	±5% of reading
Process connections	ANSI, API, UNI or according to project specifications
Nominal diameter	DN 50 (2") – DN 300 (12"), larger sizes available on Customer request
Material	Carbon steel, Duplex steel or according to Customer specification and process requirements
Design pressure	100 bar (1450psi) and 230 bar (3300psi) in standard configurations. Special configurations available according to process requirements
Process temperature	-40°C (-40F) - 300°C (572F)
Ex approvals	ATEX CE Ex II 1 G Ex, US Class1 Division1&2, IEC Zones 1&2 Exd Other approvals available on request
Communication	Analog (4-20mA), Modbus (Ethernet or serial) Other standards available on request
Pressure drop	0.3 – 1 bar
Size and weight	Footprint 0.5 x 0.8 mt, height 1.2 mt, 390 kg (for a standard 4" ANSI 1500 meter)
Flow direction	Vertical downwards
Output signals	Gas, liquid and water flowrates, liquid and water density, pressure and temperature



# Multiphase flow measurement for upstream applications

ABB VIS is the state-of-art-technology for the measurement of multiphase streams. Even in the most demanding applications, VIS is able to provide reliable real-time measurement of gas, oil and water with unparalleled accuracy.

## No gamma source involved

Unlike most of the other products available on the market, VIS is radioactive-free. This is of paramount importance when dealing with shipping, handling, commissioning and decommissioning procedures, when applying for import/export permits and with any maintenance action performed on the device. More safety + Less delays + Less paperwork = Improved bottom line.

## Conventional instrumentation

VIS employs only standard process instrumentation. This is a huge advantage for maintenance activities, since operators do not have to face complex devices but conventional instruments like they already work with.

## Unique and patented technology

ABB VIS is based on a unique and patented technology, the isokinetic sampling enables extracting a representative portion of the stream and accurately determines the different phases flow rates. VIS has more than 40 installations worldwide and has been able to provide superior accuracy even in the most challenging flow conditions. VIS proved to be reliable also for the detection and metering of liquid fractions below 10<sup>-4</sup>%.

## Tailored for gas storage applications

VIS' unique technology and design make it perfectly suited for gas storage fields, where it is installed instead of a traditional orifice plate providing real time liquid flowrate data that can be used to optimize and enhance gas extraction.

## Protect your investment

Aging reservoirs are characterized by progressively reducing liquid hydrocarbon flow and increasing water and gas fractions. As GVF moves higher and higher only an MPFM designed to work at such extreme conditions will be able to protect your investment. VIS is tailored for very high gas content applications. Its operating range allows managing the aging of reservoirs, when the gas fraction tends to increase above 99%. VIS is also the perfect solution for oil wells subject to gas-lift operation where large amounts of gas are extracted together with the liquid phase.

## No size limitations

VIS can be applied to all the usual pipe dimensions: it has been successfully installed on a 16" pipe.



### **Largest turndown available**

The VIS design can be customized in order to increase the gas turndown up to 100:1, the largest available on the market.

### **Portable solution**

VIS can be provided in compact skid-mounted configuration, suitable for mobile well testing units.

### **More robust in challenging flow conditions**

The isokinetic technology and the measurement principle used by VIS make it unaffected by fast slug streams, maintaining its accuracy in these challenging flow applications.

### **Customizable according to specific requirements**

VIS can be provided in different materials from standard carbon steel to duplex steel or other alloys depending on project characteristics and operating conditions.

### **Service network always available**

As a further advantage, ABB provides prompt assistance thanks to our worldwide network of experts and engineers.





# A success story

## First ever application of wet gas meter based on isokinetic sampling

The first industrial wet gas meter based on TEA Sistemi's patented isokinetic sampling was designed and installed offshore, in the Gulf of Mexico, in August 2002 [1]. The meter was an 8 inches nominal size with capacity of 100 MMSCDF, with a very small percentage of liquid, less than 0.3% corresponding to 400 BBLD: it is a significant production rate in absolute terms, but a very critical percentage amount that challenges most other multiphase devices.

[1] P.ANDREUSSI, P.CIANDRI, A. ANSIATI, S.BOSCHI, F.PAONE. "Application of Wet Gas Metering in the Gulf of Mexico", OTC 2003, paper 15361, Houston, 5-8 - May 2003.

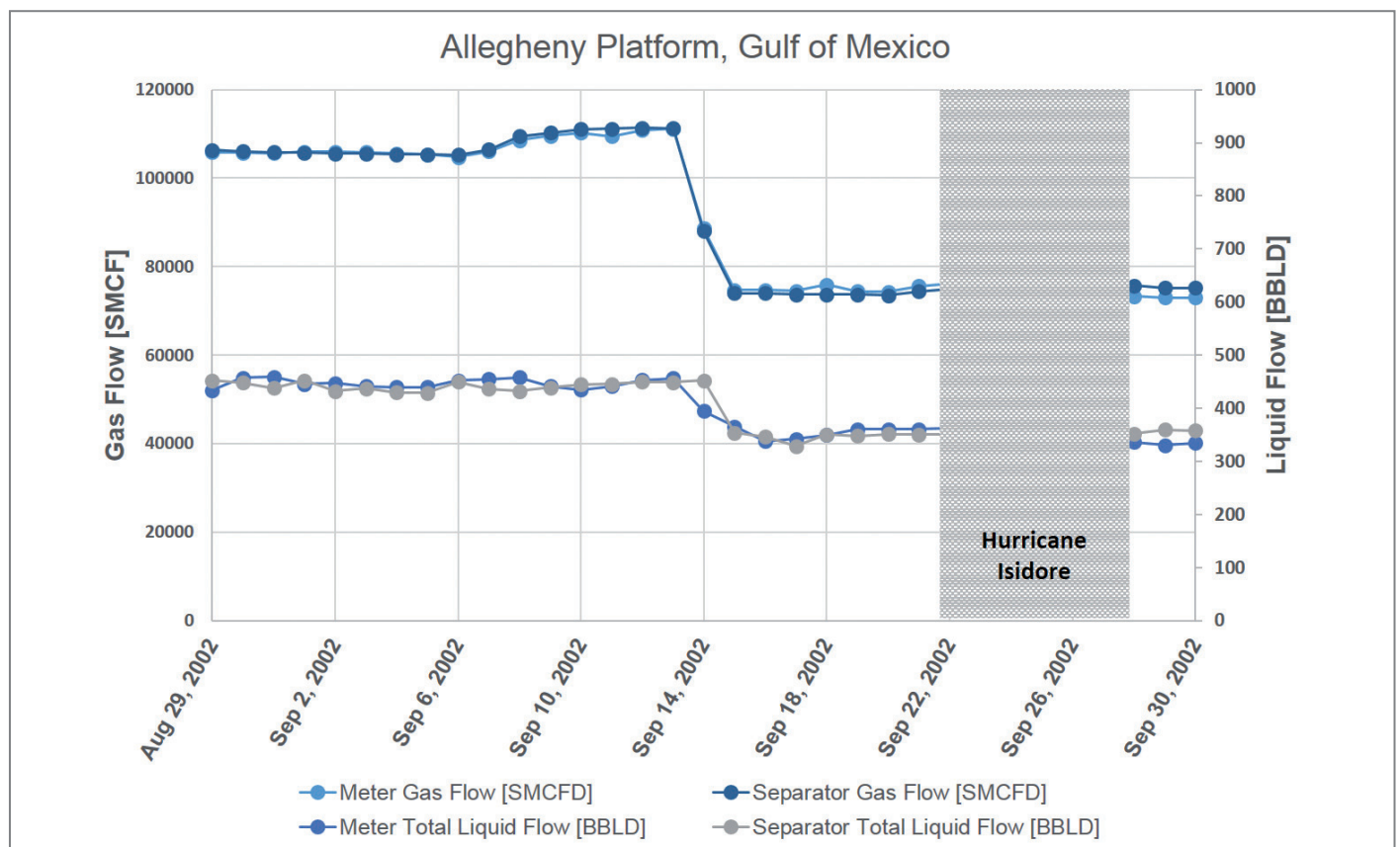


In addition, the production site was characterized by very challenging process conditions: large gas velocities, pressure above 1500psi together with very low condensate and water fractions. Under these conditions, typical commercial MPFMs struggle to provide reliable and accurate readings.

At the site, wet gas measurements of the meter were compared with data obtained with a conventional well testing system, certified by MMS (Minerals Management Service, US) for production allocation.

The isokinetic technology showed outstanding performances, able to match the conventional separator values with very good accuracy:

- Gas measurements were provided with a discrepancy just above 1% (1.1%).
- The difference between total liquid readings was below 3% (2.6%).



# Trusted measurement solutions

## Serving the oil and gas industry

As a world leading supplier to the oil and gas industry, ABB provides customers with the measurement solutions to run operations safely, productively and profitably. As a true global supplier, ABB provides expertise wherever in the world it is needed. Customers investing in ABB's measurement products and solutions receive the best technology and application expertise in the business.

ABB supplies an unparalleled selection of measurement solutions for use throughout all the stages of oil and gas production. From topside instrumentation to subsea wellhead flowmeters, ABB's innovative products deliver cost-effective solutions that feature world-class performance.

The portfolio includes:

- Flow measurement
- Temperature measurement
- Pressure measurement
- Analytical measurement
- Level measurement
- Valve automation

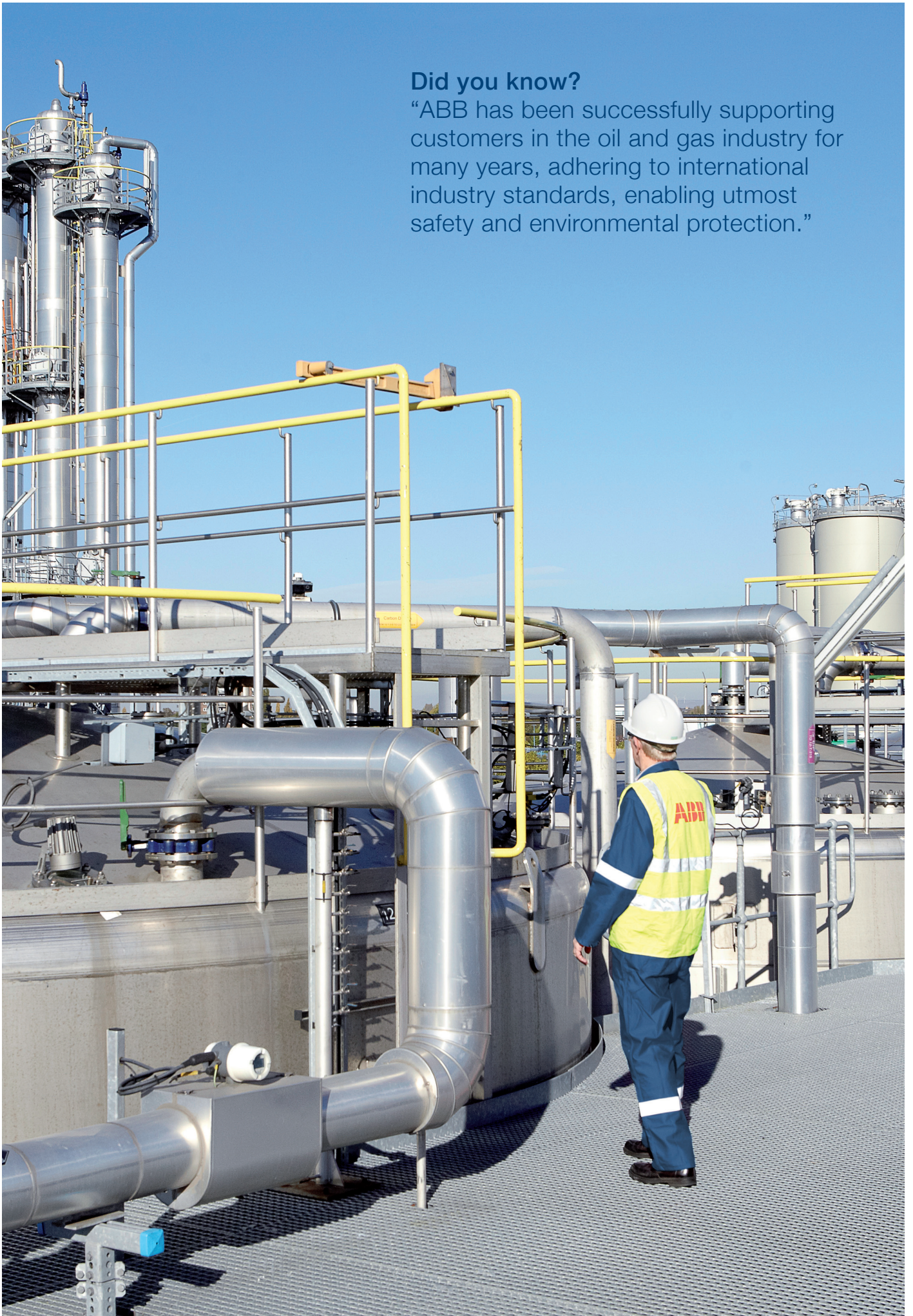
Extensive experience with offshore applications throughout the world results in a partner that provides customers with the right solutions at the right time. From standard pressure, temperature and level measurement to subsea flowmeters, ABB offers proven solutions for the wellhead, drilling and production. ABB specializes in providing the customer with standalone solutions for the toughest application or integrated solutions that combine instrumentation, control and electrical automation to improve operational efficiency. ABB helps customers operate safely while protecting the environment.

Whether the need is located on a wellhead platform or an FPSO, ABB offers the measurement solution.



## Did you know?

“ABB has been successfully supporting customers in the oil and gas industry for many years, adhering to international industry standards, enabling utmost safety and environmental protection.”



# Contacts

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