

# FINDING THE RIGHT METERING SOLUTION FOR MIDDLE EAST FIELDS

Lars Anders Ruden from Emerson Process Management explains why multiphase and wet gas meters are key to many Middle East operators' reservoir management and future field development activities

**A**s more and more Middle East operators, such as Saudi Aramco and PDO, put on record ambitious field recovery goals, the role of multiphase and wet gas meters in generating accurate information on a well's production capabilities (water saturation and breakthrough, permeability and flow characteristics, for example) is only likely to rise.

Yet, as the importance of such meters increases, so do the challenges and difficulties in finding the right metering solution for the right field.

In the Middle East, the highly varied and often difficult field conditions provide significant challenges to multiphase and wet gas deployment. Such challenges include the continued growth in brownfields with many oil and gas wells produced over a wider range of process conditions where more liquid and water is present. Wet gas fields with high gas volume fractions (GVF) are also prevalent. In these circumstances, accuracy in water production is vital in detecting formation water as is the need to measure the process flow over the entire range of the GVF.

Measuring water salinity has also become increasingly important – often viewed as a key operational parameter for reservoir management and flow assurance. Salinity measurement tells the reservoir engineer

whether formation water is entering the flow and also helps the process engineer adjust injection rates of scale and corrosion inhibitors.

Operating conditions in particular fields are also a challenge. For example, sour gas fields, such as Abu Dhabi's giant Shah field, come with both HS&E and measurement challenges. The presence of high and fluctuating H<sub>2</sub>S concentrations makes it difficult to accurately measure the flow rates of oil, water and gas in the well streams.

Sand, such as in the tight gas sand reservoirs of Saudi Arabia, also has the potential to interfere with multiphase equipment as does scaling that can cause inaccurate multiphase measurements, with the scale forming a layer on the inside of a meter.

Finally, there are the increasingly complex infrastructures on many Middle Eastern fields with size, weight and instrument compactness all key criteria in meter selection.

In summary, there is a lot to think about when opting for the right multiphase or wet gas metering solution in Middle Eastern fields.

Questions need to be addressed, such as "Will I be using my multiphase meter for well

testing? Am I expecting high water cuts and varying salinity? Will I be using the meter in multiphase or wet gas flow or both? And are there any other potential threats to accuracy and production, such as sour gas, scaling or sand?"



The Roxar 2600 Multiphase meter

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Yet are today's multiphase and wet gas metering solutions addressing these questions and providing meters that meet the very different requirements of Middle East fields?

To date, the answer appears to be mixed. Many of today's metering solutions are characterised by inaccuracies in high GVF fields, a limited understanding of different flow regimes, questionable robustness when operating in High Pressure/High Temperature environments, and no provisions for features such as salinity measurement to operate alongside multiphase meter measurements.

Many metering solutions also consist of a tightly integrated product where each component is designed to work specifically with another, with the operator ending up paying for features they don't need.

It's against this context that Emerson has focused on a flexible and modular design in its Roxar multiphase and wet gas meters, ensuring that operators have the right solution for their specific fields.

For example, while the Roxar Multiphase meter (MPFM) 2600 has a number of non-optional features, such as a field-replaceable insert venturi and a new measurement principle based on an electrode geometry sensor

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which allows for measurements in separate sectors (highly robust against variations in H<sub>2</sub>S concentration), other new modules can be added as required.

This includes a wet gas software module for high GVF applications, non-gamma multiphase software, scale and wax detection features and a dedicated salinity probe for measuring water conductivity and salinity in the multiphase flow. For operators concerned about sand and erosion management, they can also access different

software modules through Emerson's field monitoring system, Roxar Fieldwatch.

Such flexibility also extends to size with the new Roxar subsea Multiphase meter, for example, significantly more compact than its predecessor. This reduced size allows operators to install the meter on individual wells and in previously inaccessible locations, as well as replace earlier multiphase meters.

It's this flexible approach along with highly accurate measurements that has led to Emerson's Roxar multiphase and wet gas meters being used throughout the region.

Examples include an onshore deployment on a high profile Middle Eastern field, where the multiphase meters are now an integral part of the technology plan for the field; and extensive wet gas meter deployment on the West Delta Deep Marine (WDDM) field, offshore Egypt, where the meters are providing early warnings of the water produced and have saved a number of wells from water breakthrough.

Changing reservoir conditions and operator requirements are testing multiphase meters and wet gas meters like never before.

It's incumbent on providers, such as Emerson, to adopt a flexible and modular approach, ensuring the right solution for the right field and application.