



# Kuwait 4th Flow Measurement Technology Conference

3-5 December 2019  
Hilton Kuwait Resort



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# Innovations in Non Gamma Multiphase Flow Measurement at Well heads



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# Operator Challenges - Cost Reduction Needs, Increased Field Revenue Expectations and Lifetime Metering Flexibility

**1** COST EFFICIENT METERS THAT COVER DIFFERENT APPLICATION NEEDS



“I can’t afford one multiphase meter per well — I need more cost-effective meters but ones that still provide accurate and reliable flow rate information.”



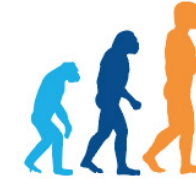
**2** ACCESS TO HIGH QUALITY DATA TO MAXIMIZE FIELD REVENUE



“I need reliable, good quality multiphase measurements to increase production efficiencies and maximize field revenue.”



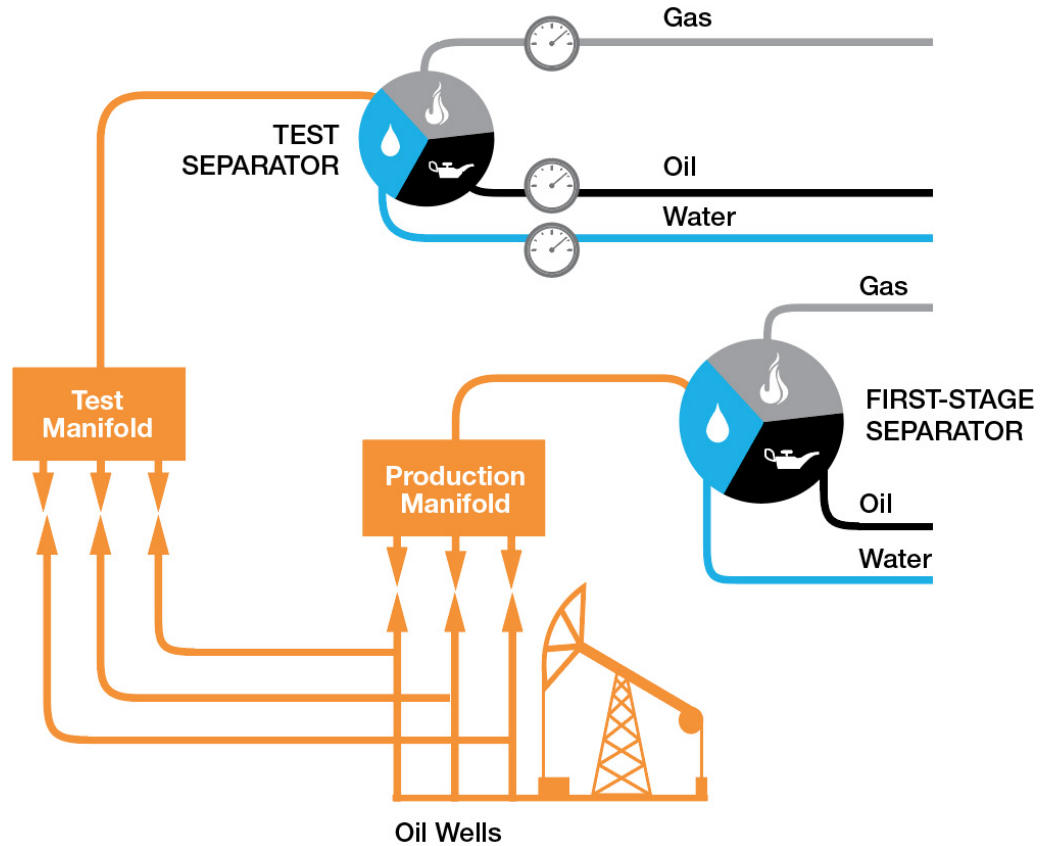
**3** A METERING SOLUTION THAT EVOLVES AND PROVIDES FLEXIBILITY



“I want a multiphase metering solution that will last for the lifetime of the well.”

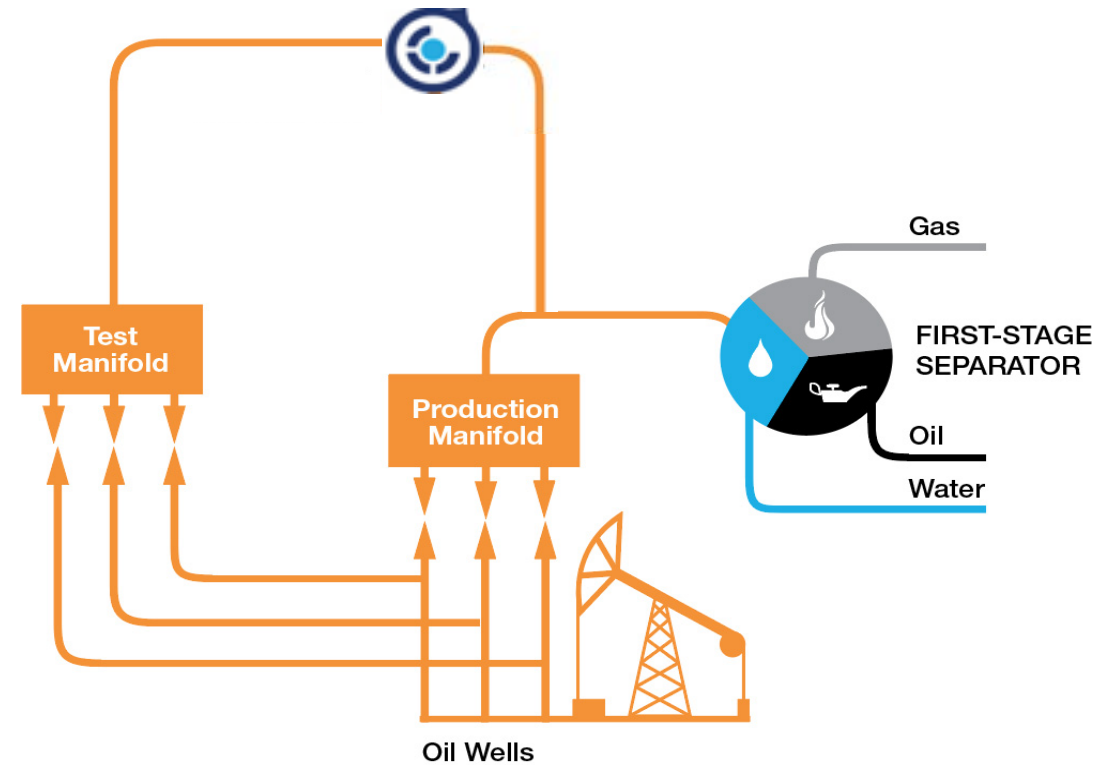


# Conventional Well Testing Versus Alternative Facility Designs to Reduce CAPEX



## Conventional method: Test separator

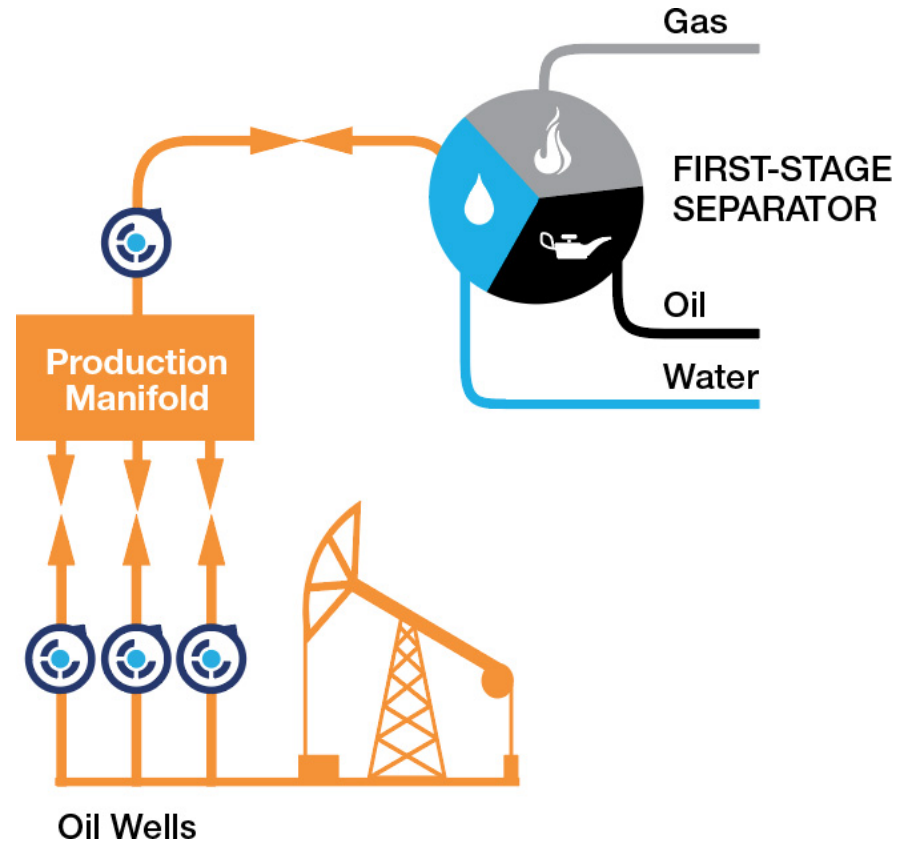
This shows a typical arrangement if using a test separator. There is then the opportunity to route each well individually through a smaller test separator shown at the top, to perform periodic measurement of an individual well. Each of the three wells can be tested in turn in this way.



## Alternative method: Well testing using MPFM

MPFM replace Test separator will enable simple piping & valve arrangements. Continuous/Repeated testing possible with reduced Capex & Opex. Also less space required in platform.

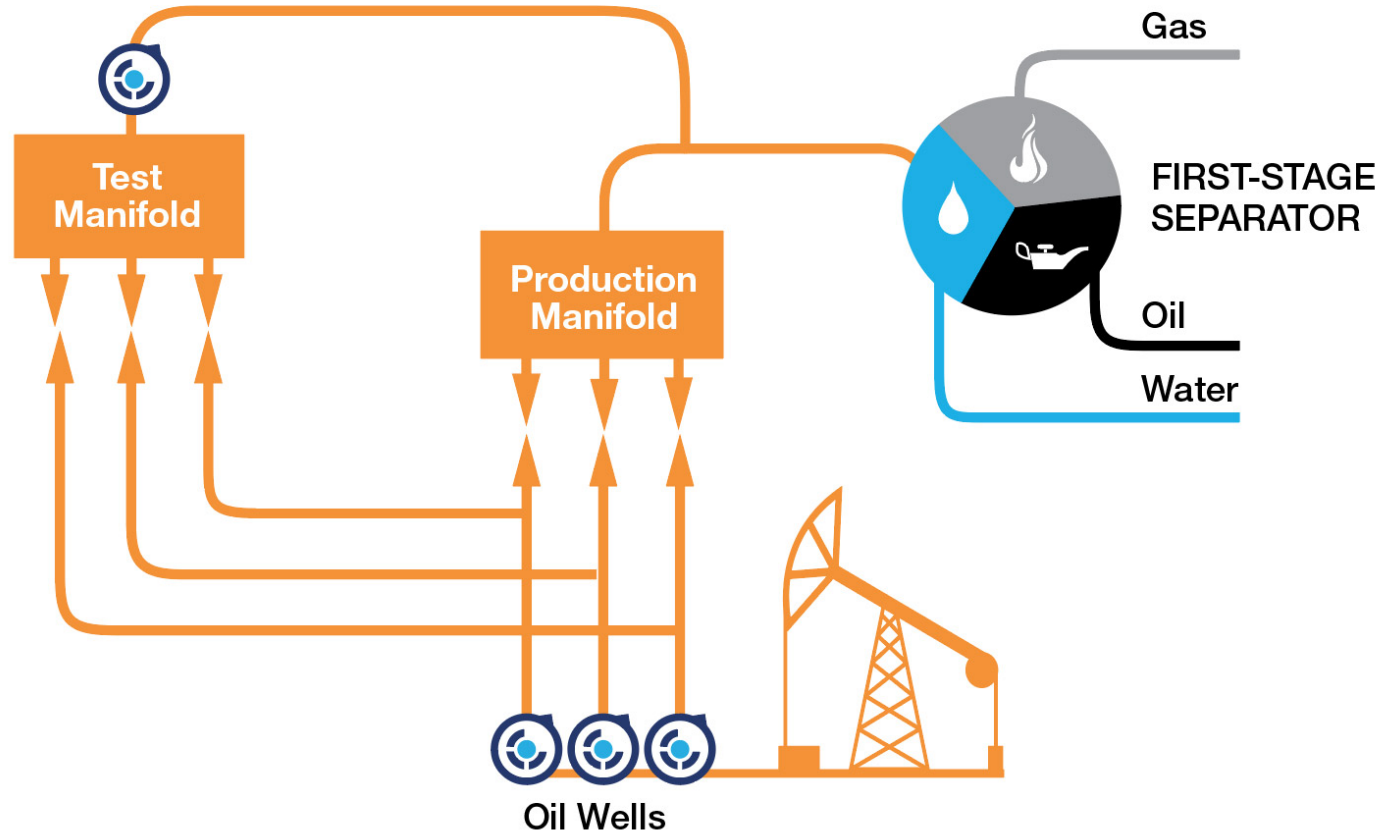
# Conventional Well testing Versus Continuous well monitoring



## **Continuous Monitoring: Inline Multiphase metering**

By using a multiphase meter, there is often no need for the test separator, manifold and line. Each well can be tested individually without having to redirect them to the test line. This solution provides continuous real time measurement instead of periodic testing.

# Alternative Facility Designs to Reduce CAPEX



## **Alternative method: Allocation and Calibration**

By using 2600 M meters for trending, continuous production insight is achieved. Use of a 2600 MVG allows for online, real-time calibration of each 2600 M, keeping measurement accurate while minimizing installation cost.



# Cost Efficient Meters That Cover Different Application Needs

## Related Challenges

- *“With the **Cost Vs Value balance being a critical factor in progression of investments, I can’t afford multiphase meters on all fields/wells”***

- *“I need a broader selection of **cost efficient multiphase meters that cover different application needs”***

## SOLUTION

- ⑩ **Significantly reduced costs** with an already field proven measurement principle
- ⑩ Non-gamma and non-venturi version **providing reliable flow rates**
- ⑩ More **compact and light-weight** solution
- ⑩ **Easy to install** with low power consumption
- ⑩ Improved user configuration and calibration tool to **allow the operator to quickly, simply and efficiently** set up the meter for their requirements





# Access To High Quality Data To Maximise Field Revenue

## Related Challenges

- *“I have trouble making accurate predictions on **where to drill or schedule work-overs to increase field productivity**”*

- *“If I could get access to data more quickly, it would **reduce risk and uncertainty on field developments**”*

- *“If I could get access to continuous data, I could **react faster to changes in my well**”*

## SOLUTION

- ⑩ A reliable, field proven measurement principle, **minimizing risk of performance challenges and providing consistent measurement quality**
- ⑩ **Advanced signal processing** and electrode geometry providing reliable flow measurements
- ⑩ **Reliable velocity measurements** with limited PVT data input requirements
- ⑩ **Non-gamma version** effective in all operating conditions
- ⑩ By installing one meter per well, the meter will provide **immediate alerts to changes in flow rates, composition, behaviour and GVF** to allow quick response times to optimise production



# A Metering Solution That Evolve And Provide Flexibility

## Related Challenges

- *“My fields and their flow conditions continue to change with no single measuring method applicable for all situations”*

- *“I need a **flexible technology platform** that can form the basis for my flow measurement requirements but can be customized to **meet varying field conditions**”*

- *“I don’t want features I don’t use or need as this **adds complexity than can lead to increased risk of failure and increased maintenance requirements**”*

## SOLUTION

- ⑩ The modularity concept ensures **customers only pay for the features they require**
- ⑩ A **high degree of freedom** is available regarding the components that can be separated and recombined **to meet the specific requirements of the field / well**
- ⑩ As **flow conditions and measurement requirements change** over the lifetime of the field / well, **additional modules can be retrofitted** at any time
- ⑩ The field-replaceable insert venturi sleeve enables **increased operating range, extended service life and reduce uncertainties** when sizing meters based on predicted production forecasts
- ⑩ As only modules required are supplied, this **simplifies the metering solution, reducing risk of failure and maintenance requirements**



## Non Gamma MPFM's

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- Non-gamma technology is preferred by many operators
- Avoid import/export paper work
- Easy to deploy and operate
- No more operator concerns due to presence of radioactive source
- Large installed base of Non Gamma meters
- Cover full operating range
- Tested and field proven

# ROXAR MPFM 2600 M add-on modules available



**MPFM 2600 M**



**MPFM 2600 MG**



**MPFM 2600 MV**



**MPFM 2600 MVG**



**MPFM 2600**



**MPFM 2600 Non-Gamma**



# MPFM 2600 Modules and Options



## MPFM 2600 M

- ⑩ The base model MPFM 2600 M is designed for permanent, single well installations, and is a **well monitoring tool for trending watercut, gas break-through and flow rates**



## MPFM 2600 MV

- ⑩ The MPFM 2600 MV is designed for permanent well installations, for both oil and gas wells. This version provides **high accuracy flow rates for oil, water and gas over a broader range of applications**



## MPFM 2600 MG

- ⑩ The MPFM 2600 MG is designed for permanent, single well installations, and adding the gamma source **improves accuracy and robustness of the meter**



## MPFM 2600 MVG

- ⑩ The MPFM 2600 MVG is the most advanced and comprehensive meter with all the three main modules included. This meter can **be used for both single well and multi-well applications** such as flow back measurements, well testing, and allocation metering with **the best accuracy and robustness**



# CAPEX comparison and NPV Calculation



## Conventional Vs Continuous:

Number of platforms: 3 nos

Number of Wells: 3x 10 nos = 30 nos

Plant life 30 years considered for NPV Calculations.

Plant availability : 95%

Days of production: 365 days

CAPEX and OPEX included

**Net present value (NPV)** is the difference between the **present value** of cash inflows and the **present value** of cash outflows over a period of time. NPV is used in capital budgeting and investment planning to analyze the profitability of a projected investment or project.

Sr. no	Option Description	Capex MMUS\$	NPV MMUS\$
1	Conventional testing Manifold with 1 MPFM	8.98	(10.97)
2	Individual well head monitoring	8.27	(9.78)

## Additional benefits:

- Value of continuous data
- Enhanced recovery and Production optimization
- Better reservoir management



THANK YOU