ExxonMobil

A leader in fuel measurement practices

Leading the way in next-generation marine fuel measurement

In 2012 in Singapore, ExxonMobil was the first fuel supplier to introduce a mass flow metering system (MFMS) accredited by a marine port authority.

Following its success, ExxonMobil introduced MFMS in Hong Kong where it has been independently endorsed by Lloyd's Register using the expertise of Metcore International and the National Metrology Centre of Singapore – a first for the market.

Rather than measuring volume, an MFMS uses the Coriolis effect at the heart of an automated process that monitors the mass flow, density and temperature of bunker fuel deliveries. This provides vessel operators with a refuelling process that offers transparency and increased efficiency when compared with traditional manual measurement methods.

ExxonMobil was:

- First to market with a port authority approved MFMS
- First to guarantee delivery by an MFMS in Singapore
- First to deliver more than 1 million tonnes via an MFMS
- First to launch an independently accredited MFMS in Hong Kong

Significant industry-wide benefits

Mass flow metering system technology provides a wide range of benefits to vessel operators, marine industry suppliers and regulatory bodies. These include:

- Enhanced transparency – expanded measurement uncertainty of the MFMS is less than 0.5 per cent.
- Increased efficiency – measuring fuel mass directly reduces uncertainties associated with density, temperature and other factors such as tank geometry.
- Major time savings – the system offers the potential to save up to three hours per delivery.[1]
- Improved traceability – measurement data is logged throughout the entire delivery process, illustrating the fuel mass transferred at any point in time, offering a transparent and accurate measure of delivered fuel.

A secure and reliable measurement solution

Enhancing the integrity and security of the measurement process, ExxonMobil's MFMS provides vessel operators with a fuel measurement solution they can trust.

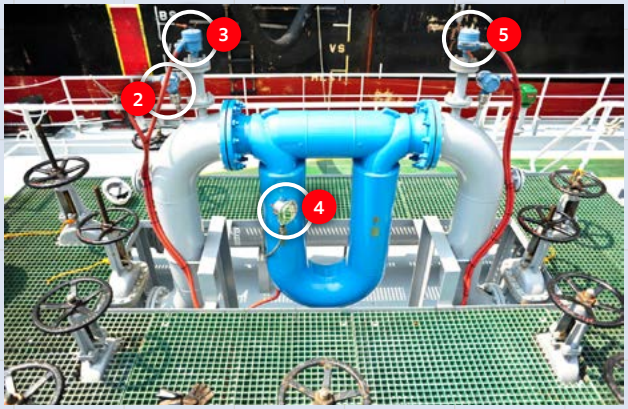
- Mass flow meters are calibrated in line with OIML R117 and ISO 17025 standards and are independently validated and sealed.
- Systems have no flow-bypass after the meter, and any bypass systems on ExxonMobil bunker tankers are blanked off and sealed.
- The MFMS' associated pipelines, valves, gauges and barge equipment are sealed and their security validated by an independent third party.
- The meters are subjected to periodical calibrations and zero verification.
- Information systems are secured via a sealed transmitter and measurement tickets are printed via a designated secure printer.
- Buyers can examine meter totaliser records and can check to ensure the meter's security is intact using a meter checklist.
- Stringent practices ensure that ExxonMobil's MFMS are maintained to a consistent standard irrespective of location. This is independently verified by the port authority in Singapore and MFM+ Program in Hong Kong.

1 Comparison versus tank gauging.

Security seals help ensure system integrity

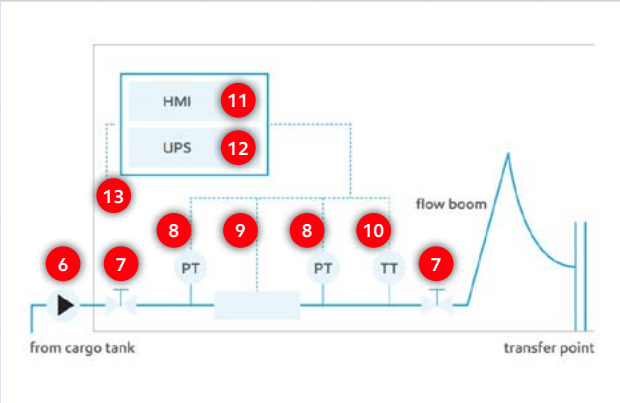
Physical seals with unique numbers for all critical elements verify system security and guarantee traceability.

Stainless steel wires are sealed with unique identifiers for security and peace of mind.



Seals act to reassure the system's security.

Typical schematic diagram of MFMS for delivery

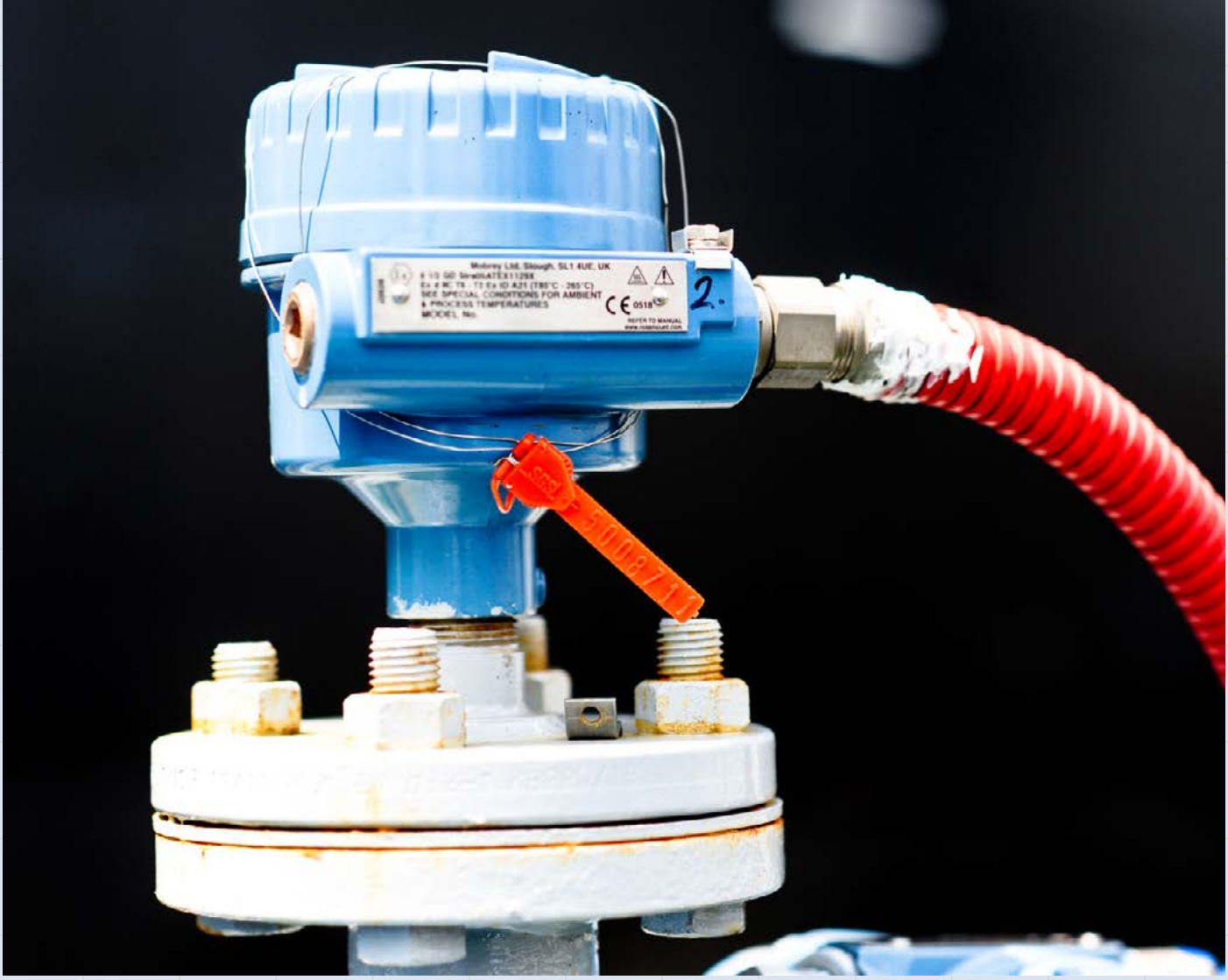


Physical seal locations:

1. Transmitter
2. Pressure transmitter
3. Upstream liquid detector
4. Enhanced core processor
5. Downstream liquid detector

System components:

6. Pump
7. Gate/isolation valve
8. Pressure transmitter
9. Coriolis flow meter
10. Temperature transmitter
11. HMI – Human Machine Interface
12. UPS – Uninterrupted Power Supply
13. CP – Custody Printer



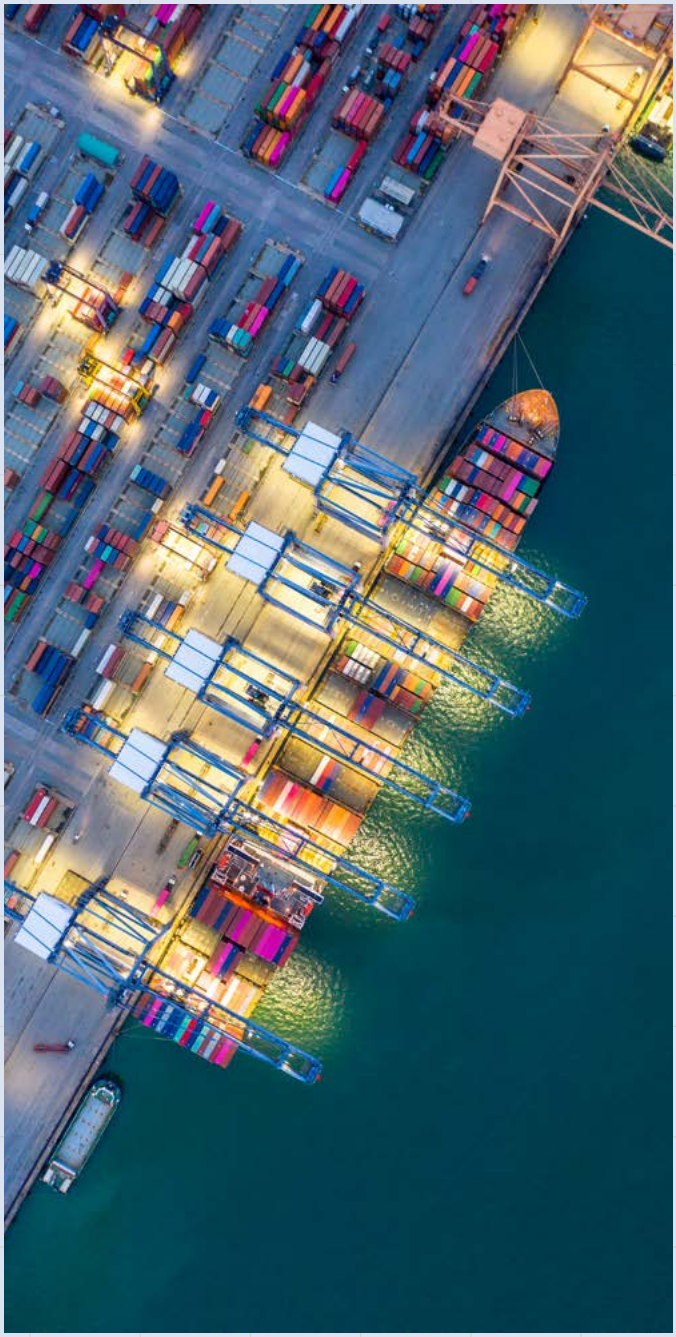
Measurement you can count on

The mass flow metering system, with its added security measures combined with technological improvements, displays the necessary characteristics of a good measurement system.

Good Measurement Practices	Mass Flow Metering System
Accurate	✔
Approved by the port authorities and independently validated	✔
Secure	✔
Transparent	✔
Saves time	✔
Cost effective	✔

Truly transparent business

We pride ourselves on our open business practices. We are continuously working to improve the integrity of our measurement techniques and implementing advanced metering technology – so you can see exactly what you're getting.



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