



APPLICATION REPORT Oil & Gas

Custody transfer measurement of marine fuels

- Billing of the supplied bunker fuels according to MID MI-005
- Mass flow measurement of diesel and fuel oil with different viscosities
- Space-saving installation with dual measuring tube in straight tube design



1. Background

Bomin Group, one of the largest independent global suppliers of marine fuels, operates a fuel depot in Kiel on the Baltic Sea. At this location, freighters and other transport ships are supplied with bunker fuels. The terminal has a berth of 375 m / 410 yd. The quayside has several bunker stations with a total storage capacity of over 33,000 m³. The plant is designed for the fueling of ships with fuels of different viscosities. The fuel depot provides a continuous 24/7 service, and therefore must be constantly ready for loading. The bunkering takes place "ex-pipeline" for custody transfer operations.

2. Measurement requirements

In order to bill the supplied bunker fuels correctly, Bomin relies on the use of process measuring technology that fulfils the necessary requirements for continuous and dynamic measurement of liquids other than water, as prescribed by the European Measuring Instruments Directive (MID) MI-005. To equip two pipelines in its bunker stations, the fuel depot operator sought flowmeters that are approved for custody transfer according to MI-005 and ensure a correspondingly high accuracy and reproducibility of the measuring results. The main parameters of this application included a measuring range up to 4000 kg/min / 8820 lbs/min and different viscosities up to 400 c St. The pipelines have a nominal diameter of DN 100 / 4" and DN 150 / 6". Due to the low line height, installation of U-shaped mass flowmeters is not possible in these diameters. In addition, the design of the existing piping does not allow inlet and outlet sections.

Pipeline 1: DN 100 / 4"	
Medium:	Diesel
Measuring range:	185...3000 kg/min / 418...6613 lbs/min
Density:	0.890 kg/L / 55.5 lbs/ft ³
Viscosity:	2...8 c St
Temperature:	20...80 °C / 68...176 °F
Pressure:	3.5 barg / >50 psig

Pipeline 2: DN 150 / 6"	
Medium:	Fuel oil
Measuring range:	420...4000 kg/min / 926...8818 lbs/min
Density:	0.890 kg/L / 55.5 lbs/ft ³
Viscosity:	400 c St
Temperature:	20 °C / 68 °F
Pressure:	3.5 barg / >50 psig

KROHNE

3. KROHNE solution

KROHNE supplied 5 OPTIMASS 2300 mass flowmeters with straight dual tube. 2 device units made from duplex stainless steel were provided in DN 150 / 6". For the 3 other measuring devices in the nominal diameter DN 100 / 4", stainless steel 304L was used. All devices were installed in a confined space. The mass flowmeters do not require inlet and outlet sections. For outdoor installation, the straight dual tube measuring devices are certified according to IP 67. The OPTIMASS 2300 is designed for the measurement of high volume flow rates and is able to determine mass as well as volume, density and concentration.

The Coriolis mass flowmeter is approved for custody transfer according to OIML R 117 and therefore has MID MI 005 approval based on the European OIML Directive. For the approval of accuracy class 0.3, the measuring device has been previously tested on external and traceable test rigs with different viscosities.



Space-saving installation thanks to dual straight tube design



Measurements subject to custody transfer with OPTIMASS 2300 C in the fuel depot

4. Customer benefits

The OPTIMASS 2300 C meets the high performance requirements of the OIML R 117 standard for custody transfer measurement. Despite the varying viscosities, the OPTIMASS 2300 fulfils the required measuring accuracy according to OIML due to its construction and design. As a result, Bomin benefits from a mass flowmeter, which today achieves the best OIML accuracy class 0.3. In other words, all the measuring results, even with different viscosities, are within an error limit (maximum permissible error) of 0.2%. The dual straight tube of the OPTIMASS 2300 offers significant advantages. Unlike other measuring devices with curved tube geometry, with this version, higher viscosities do not result in return flow effects that may influence the measuring results.

In addition, the straight tube design of the OPTIMASS 2300 allowed the space-saving installation of device units, so that the existing infrastructure could be used.

The OPTIMASS 2300 therefore has greater flexibility compared with U-shaped mass flowmeters of other manufacturers, which have to make substantial conversions to existing nominal diameters and have a low installation height of the pipelines.

5. Product used

OPTIMASS 2300 C

- Coriolis mass flowmeter for liquids and gases
- High levels of accuracy for custody transfer (MID 2004/22/EC MI-005)
- Flow rates up to 2,300,000 kg/h / 84.510 lbs/min
- Super Duplex option for operating pressures up to 180 barg / 2610 psig
- Best in class for zero stability
- Modular electronics concept

Contact

