



Photo courtesy of Bahía de Bizkaia Gas S. L.

APPLICATION REPORT Oil & Gas

Custody transfer LNG ship loading and unloading

- High accuracy Coriolis mass flow measurement of LNG with a large flowrate
- Complete custody transfer (CT) measuring system for cryogenic liquids
- Continuous and consistent measurement results from start to finish even in the event of entrained BOG (Boil-off Gas)



1. Background

Bahía de Bizkaia Gas (BBG) operates a plant for the reception, storage, regasification and loading of Liquefied Natural Gas (LNG) in the port of Bilbao, Spain. Only recently has the storage capacity been increased up to 450,000 m³ (15,891,600 ft³). In this way, the company is able to receive larger LNG carriers as well as to load LNG carrier ships quickly and efficiently. The jetty can accept vessels of 270,000 m³ (9,534,960 ft³) storage capacity. The terminal has a maximum gas send-out rate of 800,000 Nm³/h (498,442 SCFM).

2. Measurement requirements

BBG were searching for Coriolis mass flowmeters to accurately and reliably measure LNG and BOG with flow rates ranging from 15...186 t/h. Due to the nature of the LNG application, it was critical that the meters were CT approved and conformed to Measuring Instruments Directive (MID) MI-005 for liquids other than water.

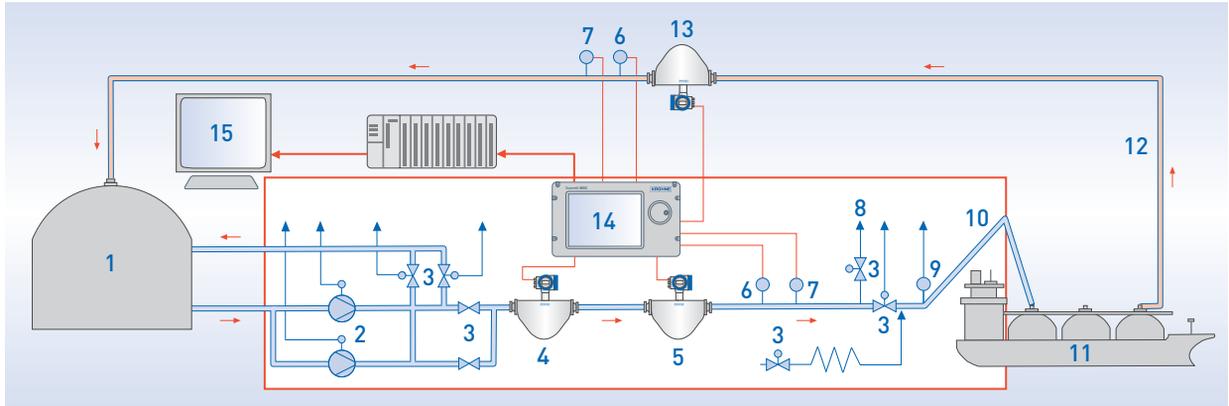
Safety is a high priority for BBG which meant the meters required ATEX approval for hazardous environments. They were also required to integrate with a flow computer for CT metering.

3. KROHNE solution

KROHNE delivered a complete custody transfer cryogenic system as part of a ship loading system approved according to MID 2014/32/EU. The OPTIMASS 6400 F mass flowmeter offered a solution for custody transfer loading and unloading of LNG. The KROHNE device features a twin V-shaped measuring tube made of stainless steel (316L). It was supplied in nominal size DN200.

KROHNE

Another high accuracy (MI-002 approved) OPTIMASS 6400 flowmeter (DN150) was also included to measure BOG produced by the loading process as it was returned to storage. In addition, KROHNE also provided the SUMMIT 8800, a digital flow computer for CT measurement. The flow computer transfers all measurement data to the distributed control system (DCS) via Modbus RS-485.



Measuring system (MID MI-005, 2014/32/EU) for ship loading of cryogenic liquids as suggested by KROHNE
 1 LNG tank; 2 Pumps; 3 Valves; 4 OPTIMASS 6400 (MI-005 flowmeter); 5 OPTIMASS 6400 (master meter); 6 Pressure transmitter; 7 Temperature sensor; 8 Circulation line; 9 Pressure gauge; 10 Ship loading; 11 LNG tanker; 12 Line with boil-off gas (BOG); 13 OPTIMASS 6400 (MI-002 gas flowmeter); 14 SUMMIT 8800 flow computer; 15 Distributed control system (DCS)

4. Customer benefits

BBG benefits from a complete CT system. The OPTIMASS 6400 provides a high accuracy CT measurement of LNG as well as a flow measurement of BOG. Due to its integrated Entrained Gas Management (EGM™), the meter continues to measure even during start-up phase when vapour break out might occur. The EGM™ functionality reduces the cooling time, enabling a faster loading and unloading process. The 2-phase flow diagnostics signal is used to control start/stop.

Using the OPTIMASS 6400 with EGM™ functionality has helped Bahía Bizcaia Gas to considerably increase the accuracy and repeatability of measurement and allowed them to better meet the production quality criteria. KROHNE fully complied with the quality requirements that BBG had for the measurement.

Working together with the main instrumentation vendor KROHNE payed off for the customer. From consultation to project management to the supply of the Coriolis mass flowmeters and the SUMMIT flow computer to the integration of the CT system into the customer's DCS – everything has been provided from one source.

5. Products used

OPTIMASS 6400 F

- Twin bent tube Coriolis mass flowmeter for CT measurement of cryogenic liquids over a wide dynamic range
- Entrained Gas Management (EGM™): continuous measurement across a wide range of gas fractions and challenging process applications
- Integral insulation casing for safety
- HART®, FF, PROFIBUS® PA & DP, Modbus and PROFINET



SUMMIT 8800

- Flow computer for custody transfer (CT) measurement
- Compliant with all main international standards (OIML, ISO, API, AGA, GOST etc.)



Contact

Would you like further information about these or other applications?

Do you require technical advice for your application?

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