Reference case study
RC/FB101-EN

High Accuracy Flowrate and Alcohol Content Measurements in a Distillery

Kraul & Wilkening u. Stelling

Food & Beverage

Instrumentation Solutions

- Highest accuracy for flowrate and density measurements
- Independent of fluid properties, e. g., conductivity
- Wear free through use of Coriolis technology
- Install in any orientation, without in- and outlet flow conditioning sections

ABB Instrumentation

1 Company Profile

The Kraul & Wilkening u. Stelling company has been producing bio-ethanol and technical alcohol since 1856 and is a specialist in the production of highly concentrated alcohol.

KWST
Kraul & Wilkening u. Stelling
Kommanditgesellschaft - GmbH & Co

With an annual production of over 20,000 m^3 ethanol and an ethanol storage capacity of over 20,000 m^3, the Lower Saxony manufacturer is one of the leading producers of alcohol from renewable raw materials in Germany.

Quality and customer satisfaction have the absolute highest priority at KWST.

2 The Problem

The alcohol produced has concentrations up to 99 %.

The alcohol must be measured gravimetrically and the alcohol content must be controlled at a constant value. Therefore a measurement instrument is required not only for

- mass flowrate metering, but also for
- density measurements for determining the alcohol content.

3 The Solution

In order to assure high accuracy flowrate measurements at these concentrations, which essentially have no conductivity, the Coriolis-Mass-Flowrate technology is utilized. It measures, with high accuracy, the mass or volume flowrate, independent of the installation or the fluid properties.

Additionally, this technology also has the ability to measure the density of the fluid from which alcohol content of the liquid can be calculated. The measured density value output from the Coriolis Meter Type FCM2000 from ABB is used to directly control the alcohol content.

This multivariable instrument outputs the value of both variables at minimum installation and investment costs. In the past, 2 instruments were usually required, now a single CoriolisMaster FCM2000 satisfies all the requirements.

.

Application Properties

Fluid	Bio-ethanol (alcohol)
Fluid density	813 kg/m^3
Concentration	88 %
Measurement range	to 5,000 kg/h
Fluid temperature	approx. 110 °C
Flowrate accuracy	better than 0.15 % of rate
Density accuracy	better than 0.001 kg/l
Installation requirements	No in- or outlet straight sections, all installation orientations are possible
Approvals	ATEX Zone 1 d, ib

For quite a few years flowmeter primaries with characteristic S-shaped double tubes have been used successfully. Utilizing a design, which is symmetrical about a point, the meter tube loop remains perfectly balanced in all installation orientations. This allows the installation to be self draining even in a horizontal orientation without any impact on the measurement accuracy.

This is only possible with this bent, double tube meter design.

Another decisive advantage of this meter tube geometry is its insensitivity to gas bubbles in the fluid. Where other measurement methods must use software calculations to compensate for their effects on the meter loop, the pipe loop effects in the CoriolisMaster are appreciably less right from the start.

4 Usefulness

Due to its unique design, the CoriolisMaster FCM2000 offers high accuracy mass flowrate metering coupled with the most accurate density measurement available in the market place in a single instrument, 2 independent measurement functions, both required in a distillery. As a result of the excellent density accuracy of 0.001 kg/l, as received from the factory, the need for local on-site calibrations are eliminated.

The clear-cut menu structure makes the start-up child's play and the Operation Manual rarely needs to be opened.

5 Features of the Components Utilized

Instrumentation	
	**Coriolis Mass Flowmeter FCM2000** • Meter sizes: DN 1.5 ... DN 150 [1/16" ... 6"] • Flow range: 0.03 ... 660,000 kg/h • Fluid temperature: -50 ... 180 °C • Flowrate accuracy: < 0.15 % of rate • Density accuracy: Standard: 0.005 kg/l, Optional: 0.001 kg/l • Communication: 2 Current outputs 1 Pulse output Contact in- and outputs HART, PROFIBUS PA, FOUNDATION Fieldbus • Installation requirements: No in- and outlet straight sections, Any installation orientation is possible • Approvals: ATEX, FM, CSA, NEPSI, GOST

ABB has Sales & Customer Support
expertise in over 100 countries worldwide.

www.abb.com/flow

Printed in the Fed. Rep. of Germany (09.2007)

3KDE010004R5501

RC/FB101-EN Rev. A

Germany

ABB Automation
Products GmbH
Borsigstr. 2
63755 Alzenau
Tel: +49 551 905 534
Fax: +49 551 905 555

UK

ABB Limited
Oldends Lane
Stonehouse
Gloucestershire, GL10 3TA
Tel: +44 1453 826 661
Fax: +44 1453 829 671

Italy

ABB Sace S.p.A.
Via Statale 113
22016 Lenno (CO)
Tel: +39 0344 58111
Fax: +39 0344 56278

USA

ABB Inc.
Automation Technology
Products
125 E. County Line Rd
Warminster PA 18974-4995
Tel: +1 215 674 6000
Fax: +1 215 674 7183

China

ABB (China) Ltd.
35th floor, Raffles City
(Office Tower)
268 Xizang Zhong Lu
Shanghai, 200001
Tel: +86 (0) 21 6122 8888
Fax: +86 (0) 21 6122 8892