



## APPLICATION NOTE Food & Beverage

### Energy balancing in a brewing line

- Mass flow measurement of saturated steam
- Output of the consumption rate in kilograms
- One measuring device replaces three individual measurement points

#### 1. Background

Next to hot water, saturated steam is one of the most important energy sources in breweries and is used in all the important production processes such as brewing, pasteurising, sterilising, washing and cleaning. The creation of steam is very energy-intensive; the firing up of the kettles is normally done using liquid fossil fuels or natural gas. For this reason, an exact measurement of the amount of steam produced is essential for the optimised control of the burner and finally, for a cost-effective and environmentally-friendly operation of the equipment.

#### 2. Measurement requirements

A large brewery was looking for a measurement solution for a steam pipe that was serving one of the brewing lines at the company. The mass flow of saturated steam needed to be measured for internal energy balancing that exhibited the following operating conditions:

Volume flow	1300...19000 kg/h / 48...698 lb/min
Pressure	5.5 bar / 80 psi
Temperature	162.1 °C / 323.8 °F
Density	2.92 kg/m <sup>3</sup> / 0.18 lb/ft <sup>3</sup>

In order to be able to compare the consumption in the brewing line with other consumers in the company, the measured volume flow needed to be converted to a mass flow. Using the predefined density, the mass flow can be calculated from the volume flow. As the operating conditions are not constant, the density variation on the saturated steam line has to be taken into consideration.

### 3. KROHNE solution

KROHNE supplied an OPTISWIRL 4070 C Vortex flowmeter (DN 200 / 8"; PN 16) with integrated temperature compensation for the saturated steam mass flow measurement. The parameters were factory set and the device was commissioned on-site by KROHNE service engineers. At this time, the density value predefined by the operating company was stored directly into the device.

### 4. Customer benefits

The brewery can monitor the quantity of steam delivered to the brewing line reliably and maintenance-free using the OPTISWIRL 4070 C. The operating company can now read off the quantity in kilograms both on-site and at the control centre. In total, the brewery has more than 100 steam measurement points that are equipped with vortex measuring devices from various manufacturers. In order to compensate for external influences, all flowmeters are connected to external temperature sensors. The new deployed device from KROHNE unifies these measurements into one, compact measuring device, saving on installation costs. From the operating company's point of view this, alongside the price, is one of the most significant arguments in favour of the product. Also, the fact that KROHNE offers a complete product portfolio and provides a single-source for different types of measurement devices was decisive.

### 5. Product used

#### OPTISWIRL 4070 C

- 2-wire Vortex flowmeter for the measurement of gases, vapours and liquids
- Integrated temperature compensation (pressure compensation optional)
- Suitable for wet gases, e.g. saturated steam
- High precision and long-term stability
- No pressure loss
- Process temperature: -40 °C...+240 °C / -40...+465 °F
- Maintenance-free



### Contact