



Application note: Chemical

**KROHNE**

▶ measure the facts

## ▶ Flow measurement of aldehyde reaction products with entrained air

- Mass flow measurement to ensure minimum flow
- Constant high measurement quality despite variable gas content in liquid medium
- Integration with control system as safety-critical application

### Background

A chemical company operates a production plant for aldehyde reaction products. These are used as intermediate products in the pharmaceuticals industry and agriculture, as well as curing agents in the manufacture of epoxy resins

### Measurement requirements

There is PCT safety equipment in place for the production process to ensure the safety of the plant and to minimise the risk to human health and the environment. The design is such that the safety function is controlled using a continuous mass flow measurement by two measuring devices operating in series. The measurement deviation of the two devices is monitored as part of the safety concept. The liquids are transported at +70 °C / +158 °F and at a density of approx. 1 kg/l or 0.036 lb/in<sup>3</sup>. Due to the chemical properties of the media and the nature of the process, there is recurrent gas entrainment.

The mass flowmeters being used were not able to handle the gas contained in the medium and the measuring performance of these devices was significantly compromised. When gas bubbles occurred, the measuring devices automatically switched to error mode. There were also major deviations in the readings. It was, therefore, impossible to obtain continuous, reliable measured values.

The need was felt for a better solution that would maintain the PCT safety function, while measuring the medium continuously and reliably, despite fluctuating gas content.

## The ideal solution – OPTIMASS 6400C

After a study of the plant and the requirements, the OPTIMASS 6400 C Coriolis mass flow meter was offered for this application. Two of these twin bent tube design flow meters were supplied in a stainless steel version (1.4404 / 316L), and connected flanges. Due to spatial conditions, the device was installed at the highest point of the plant section, upstream of a descending pipe and on the suction side of a pump.

Unlike other widely available mass flowmeters, the OPTIMASS 6400 C is immune to the negative effects of entrained air. Thanks to the patented functionality of “Entrained Gas Management” (EGM™), instead of switching to error mode or freezing at the last stable measured value, the measuring device can circumvent the loss of measuring signal, track the actual frequency of the measuring tube and reliably calculate the flow even if entrained gas occurs.



PCT safety equipment with OPTIMASS 6400 fitted in series

measuring tube and reliably calculate

## Benefits

With the OPTIMASS 6400 C the operator can reliably and continuously keep track of the flow and ensure that it does not drop below the minimum. Thanks to their EGM™ functionality, the two mass flowmeters continue to measure, even when there is a high gas content in the medium. No shutdown of the plant is required due to safety concerns arising out of deviations between the two measured values. The PCT safety equipment can be operated without interruption, hence no production losses due to unnecessary downtime, resulting in a permanent increase in the quality and volume of the product.

## OPTIMASS 6400 C

- Standard measuring device for safety integrity levels and process applications in the chemical industry
- Suitable for applications with gases and liquids
- With Entrained Gas Management (EGM™): stability with entrained gas (gas concentrations 0...100%)
- For cryogenic (-200 °C / -328 °F), high temperature (+400 °C / +752 °F) and high pressure applications (200 barg / 2900 psig)
- Measuring tube made of stainless steel, Hastelloy or Duplex
- Advanced diagnostic functions and status displays in accordance with NAMUR NE 107
- High accuracy for custody transfer (approved to OIML R117, R137, MI-005, MI-002)
- HART®, FF, PA, DP, Modbus

