

## ▶ Repeatability 2-phase flow measurement

Is your measurement with your mass flowmeter interrupted because of gas entrainment in the medium?

No matter if your process has unwanted entrained gas or if you need air inside your product, KROHNE's Coriolis mass flowmeter with Entrained Gas Management technology has come to the market to ensure stable and continuous measurements. The meter ensures continued operation across a wide range of gas fractions and complex flow conditions.

**KROHNE**

▶ measure the facts

## ▶ Continuous flow measurement with air or gas entrainments in the medium



Further product information:  
[academy-online.krohne.com](http://academy-online.krohne.com)

## ▶ KROHNE Academy online

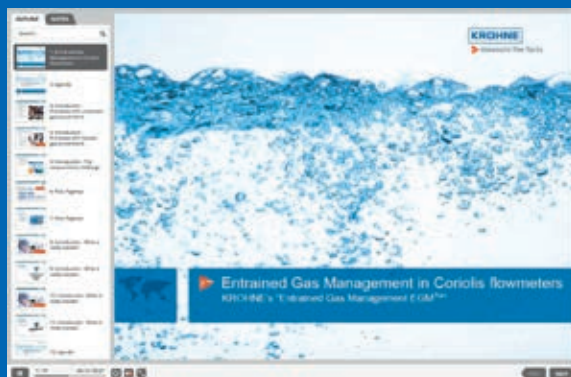


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eLearning module on "Entrained Gas Management in Coriolis flowmeters"

As part of the KROHNE Academy online we offer a variety of Web-based training courses (WBT) including a WBT covering mass flowmeters focused on Entrained Gas Management. Here you will learn about where entrained gas is present, the challenge of measuring using Coriolis mass flowmeters, Entrained Gas Management and its advantages, and applications where gas entrainment is of particular interest. The courses are all free and available for unlimited use.

Register for free:  
[academy-online.krohne.com](http://academy-online.krohne.com)

## ▶ Product overview – EGM™ available for OPTIMASS Coriolis mass flowmeter series

KROHNE's OPTIMASS series with Entrained Gas Management (EGM™) functionality is the only range of meters to offer a solution for all flow conditions at a gas volume fraction (GVF) from 0 to 100%.

- Applications with entrained gas can easily be resolved using OPTIMASS with EGM™
- Enhanced diagnostics with 2-phase signal
- Diagnostics in accordance with NAMUR NE 107 requirements
- Continuous measurement with 0 to 100% gas entrainment
- Cryogenic and high temperature applications from -200 to +400 °C / -328 to +752 °F



OPTIMASS 1400



OPTIMASS 2400



OPTIMASS 3400



OPTIMASS 6400



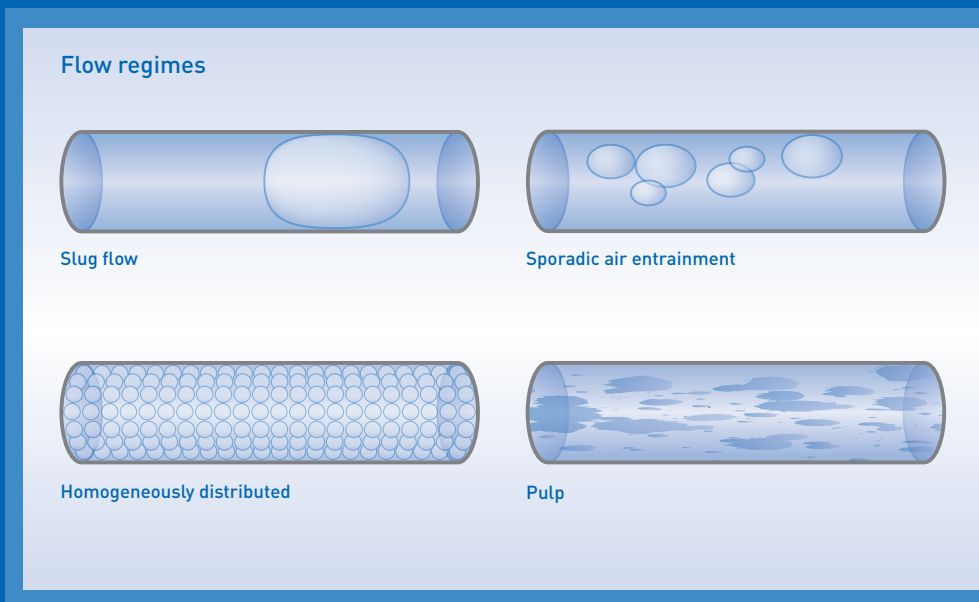
OPTIMASS 7400

## ▶ New opportunities with EGM™ functionality

The difficulty of measuring a liquid with entrained gas increases with the fraction of gas. A number of other process factors such as temperature, increases viscosity, pressure, and the relative velocity of the liquid and gas also affect the resulting flow regime.

Today OPTIMASS Coriolis flowmeters with Entrained Gas Management can provide repeatable measurement in situations like:

- liquids mixed with gas
- slurries with gases
- high viscous fluids with gas entrainments



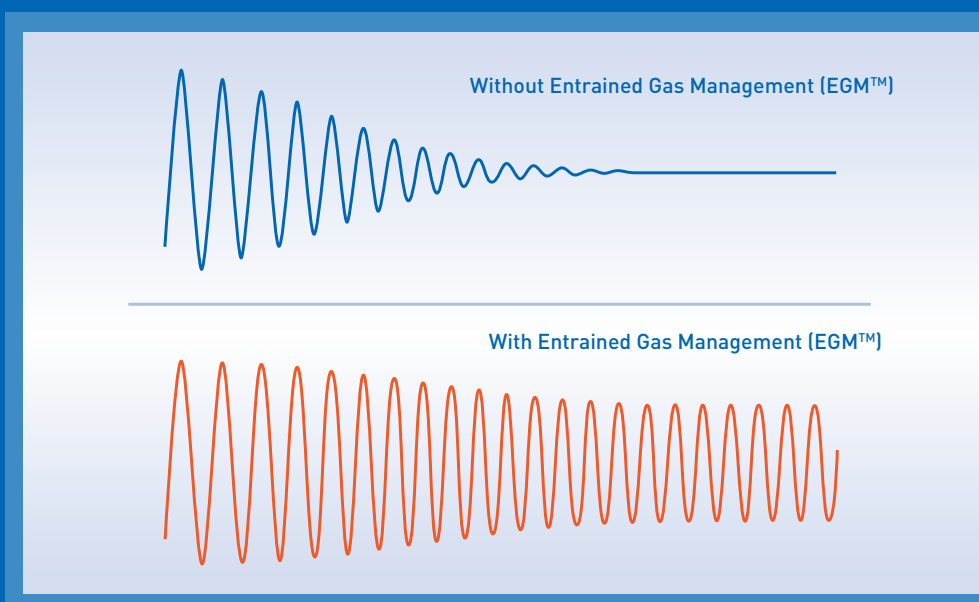
## ▶ Entrained Gas Management – the secret of 2-phase flow measurement

Without entrained air, we have the desired regular oscillation of the tubes in the Coriolis mass flowmeter.

Air entrained in the liquid dampens this regular oscillation of the measuring tubes, and as the air content increases, it can come to a complete stop.

To overcome this, KROHNE developed powerful control algorithms. These algorithms allow the meter to maintain oscillation and continue to measure even with complex flow regimes.

Even during a complete transition from a pure liquid phase to a gas phase and back, i.e. from 0 to 100% gas content, the device will continue to measure without stopping.

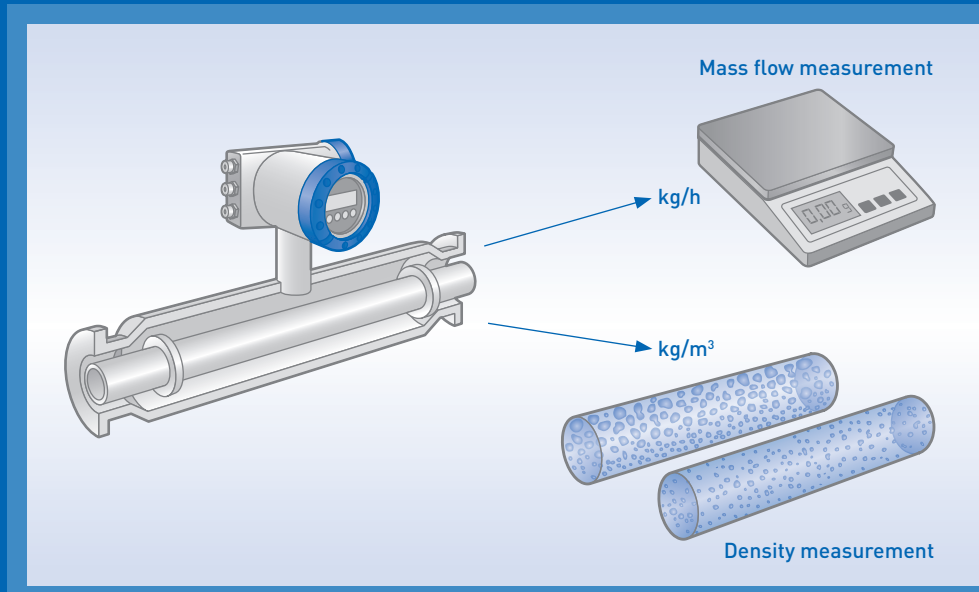


## ▶ Mass or density – both is possible even with gas entrainment

Coriolis meters can measure the mass flow and density of any fluid, regardless if it is aerated or not.

Density measurement of single-phase fluids is common practice but for traditional meters it becomes challenging with entrained gas.

In many applications where entrained gas is present, meters with EGM™ show excellent accuracy and repeatability for process control, batching, loading, offloading and transfer measurement.



## ▶ Typical applications

EGM™ has proven to be very useful in 2-phase flow and batch/loading/empty-full-empty applications in various industries:

### Food & Beverage

- Dairy
- Chocolate
- Tomato purée
- Coffee extract
- Ice cream
- Mayonnaise
- Meat
- Coolants
- Spinach
- Pre-dough
- Syrup
- Highly viscous sugar concentrates and molasses

### Chemical

- Hydrogen peroxide processing
- Highly concentrated assets such as fuming HCl or HNO<sub>3</sub>
- Viscous monomers/polymers
- Polyurethane foams
- Liquid removal from stirred tanks
- Push to empty tanks

### Oil & Gas

- Drilling fluids
- Truck loading/offloading
- Well heads
- Tank management

