

Micro Motion® MVD™ Technology with Entrained Gas Mode Improves Wet Gas Measurement

RESULTS

- Dramatically increased stability of mass flow readings
- Gained control over a critical process measurement



APPLICATION

BASF Antwerp purchased a CMF200 with RFT9739 for a critical “dry gas” safety loop application:

Process data:

- Recycle gas, stated as “dry”
- Absolute pressure 71 bar (1030 psi)
- Operational density: 10.5 to 13.5 kg/m³ (0.66 to 0.84 lb per cu ft)
- Dynamic viscosity: 0.01 mPas
- Operational flow: 1300 kg/h (48 lb/min)
- Process temp: 40 °C (104 °F)
- Piping diameter: DN80/PN100 (3”)

CHALLENGE

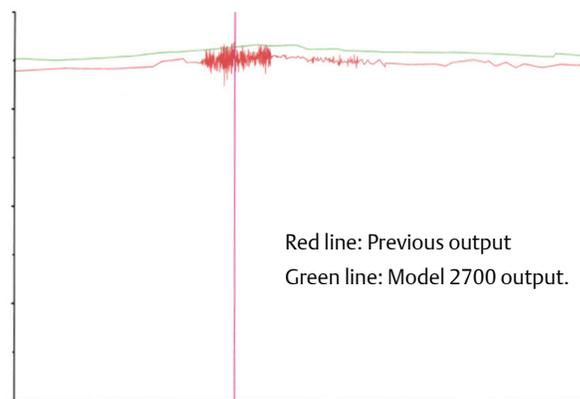
This measurement was critical for BASF. We advised BASF to install the meter with tubes upwards. Shortly after start up, BASF reported unstable transmitter signals. Sometimes the measurement was completely lost. This could create tripping and unforeseen shutdown of the operating unit; therefore the measurement was bypassed to avoid big production losses. Verification of cabling, cable glands, possible EMI interferences, power supply effects and even exchanging wiring and RFT9739 transmitters did not help.

Observation showed very unstable density readings at unpredictable intervals. After a period of very unstable measurements the flow meter would again exhibit stability. This would not last long, and soon unstable signals were again reported. Repeated investigations convinced us

“We suspected the meter’s proven ability to handle gas in liquid would transfer to handling liquid in gas — and it did.”

Dominique Van Rietvelde, Micro Motion

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Performance improvement of the Model 2700 transmitter with Entrained Gas mode



For more information:

www.EmersonProcess.com/solutions/chemical

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that this recycle gas was not dry. Gas density values up to 89 kg/m³ were reported, and indicated wet gas. BASF asked us how wet the gas might be for the Coriolis meter to still produce an acceptable reading. It was suggested that droplet diameter could be decreased using special de-mister filters, but the BASF engineers could not predict liquid-loading in the gas.

Our understanding of entrained air behavior in liquid applications led us to see a parallel to this wet gas application. Understanding MVD™ Technology, we proposed to exchange the RFT9739 with a 9-wire MVD 2700 transmitter in the 100 Hz mode. This looked promising but the results did not improve.

SOLUTION

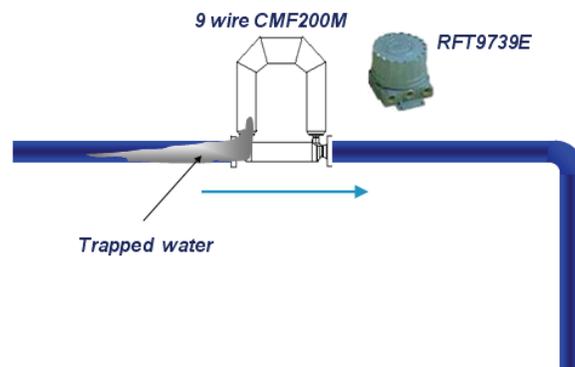
A team brainstorming session with Emerson and BASF teams resulted in the water trap theory: the velocity of the wet gas was low, thus the droplets did group themselves before the sensor creating a water trap. Once the water trap was big enough, the gas flow pushed a slug of water through the sensor. This resulted in “peaks” on the trending. It was decided to install a second CMF200 in the flag position, downstream from the first sensor, with downward flow, with MVD Technology again to avoid any risk.

Immediately the mass flow trends were quite stable. To avoid a new possible intervention the entrained gas (EG) mode was activated to see what happened and the result was even better.

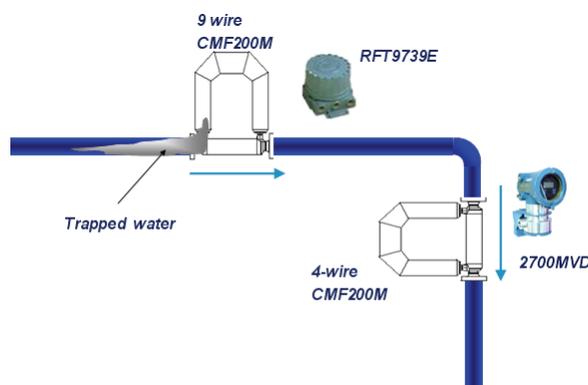
The measurement has been stable since the end of November 2005. BASF has recently decided to completely remove the old 9-wire CMF200 sensor.

The conclusions drawn from the application are:

- Meter orientation is critical: for a wet gas application the sensor must be installed in a vertical, but downwards-flowing, self-draining flag position.
- Use EG mode: originally intended for entrained air in fluids, wet gas measurement can be significantly improved with this algorithm.



“Previous” installation



“Current” installation