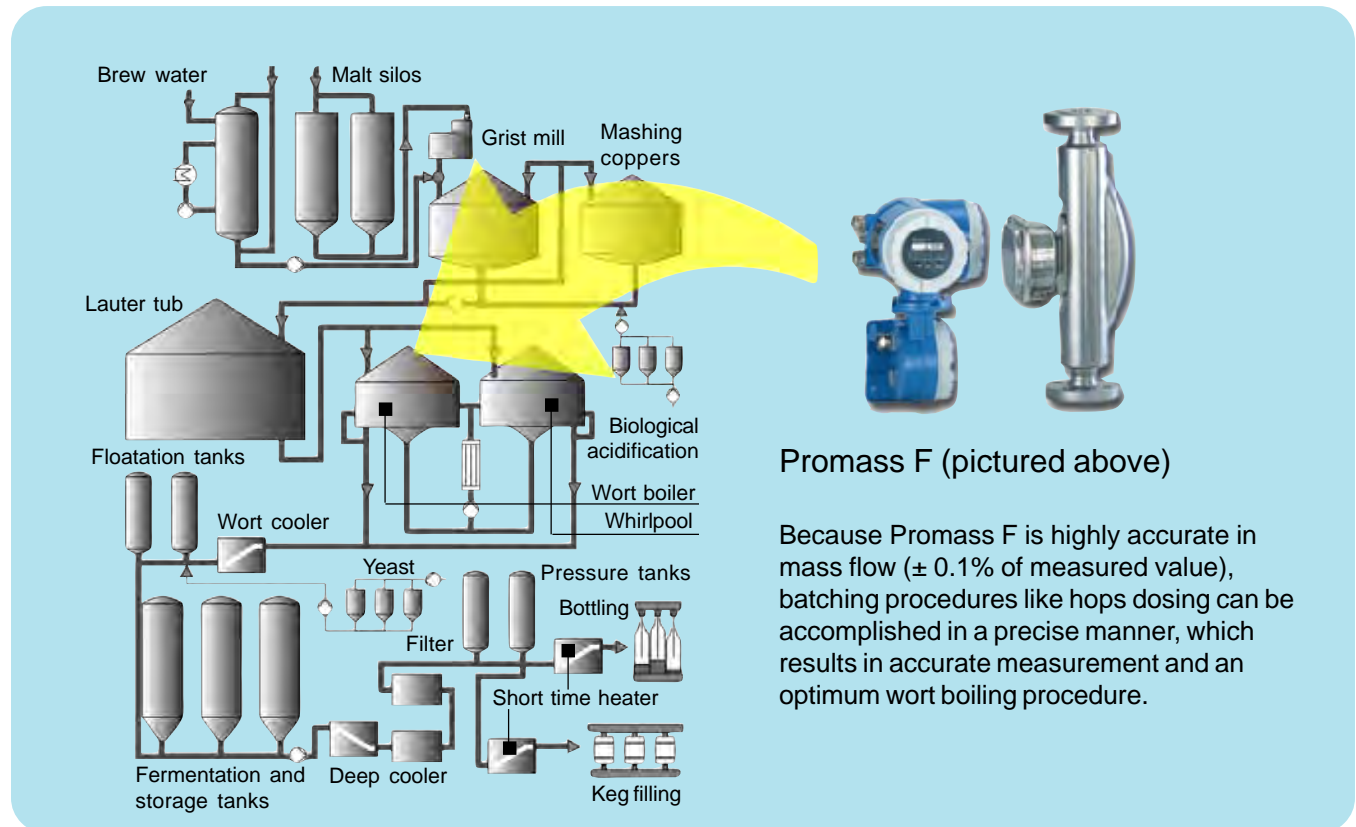


In the Brewery

Promass Provides Accuracy that Ensures Effective Boiling Procedure



Promass F (pictured above)

Because Promass F is highly accurate in mass flow ($\pm 0.1\%$ of measured value), batching procedures like hops dosing can be accomplished in a precise manner, which results in accurate measurement and an optimum wort boiling procedure.

Wort and hops, two very important ingredients in beer, are combined during a critical, high-energy boiling procedure in the brewery. The Promass Coriolis mass flow meter is providing reliable measurement as these ingredients are mixed.

Process Overview

Wort, an aqueous solution, is produced within the beerhouse. Made from malt and other cereals, wort contains the sugars, proteins, and other nutrients that produce alcohol.

Another critical beer ingredient, hops, is derived from the dried blossoms of the female hops plant. In describing the characteristic flavor in beer, the hops ingredient is often cited as an essential component of the finished product's total organic impact. In addition, hops contribute to flavor stability and foam retention.

Hops plant products can be divided into four categories – hops pellets, natural hops, concentrated hops pellets, and hops extracts in liquid form. Because of their improved quality, hops extracts have become more popular at beerhouses in recent years. The extraction process is simple. Bales are shredded and the hops cones are extracted with an organic solvent. The solution is then evaporated to recover the solvent and hops resins.

At varying strengths the wort is run off and transferred into a wort boiler where it is boiled with hops. During the 60 to 90 minute boiling process the wort is sterilized and the hops compounds are transferred into water-soluble components. In addition, this high-energy process inactivates enzymes and evaporates unwanted aroma compounds.



The role of instrumentation from Endress+Hauser

A precise amount of the hops extract must be added to the wort boiler after a short boiling period has coagulated the initial "hot break." Electromagnetic flow meters were found unsuitable for the procedure because of the low level of conductivity in the hops. A Coriolis mass flow meter from Endress+Hauser is being used to effectively measure the extract as it is added to the boiling wort.

The Promass F provides accurate and reliable measurement data at a hops dosing station. The compact self-draining design ensures that the hops does not plug within the meter.



Due to the Coriolis meter's high accuracy in mass flow ($\pm 0.1\%$ of measured value), batching procedures like hops dosing can be accomplished in a very precise manner, leading to a very accurate measurement and a boiling process that is of optimum effectiveness. The compact self-draining design of the Promass is an added benefit, ensuring that the hops does not plug within the meter and disrupt the dosing process.

The entire Promass flow meter line fulfills the stringent requirements of the food and beverage industries. When installed vertically the Promass meters can be drained to the last drop, since there are no loops in the pipe. The flow meters can also withstand CIP and SIP

cleaning procedures. All wetted parts are made of FDA approved materials, with sanitary process connections available in all common standards. Promass meters meet 3-A standards and have been tested and approved per EHEDG standards. If an application requires heating to high temperatures, the Promass sensor can endure the process temperature while continuing to provide accurate and reliable measurement data.

Other potential food and beverage applications

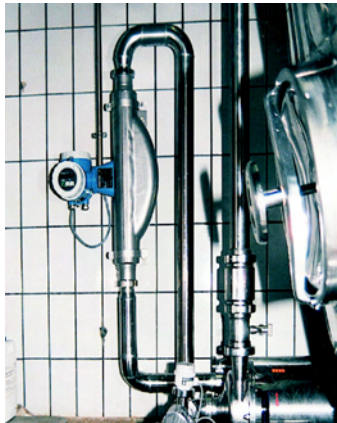
Endress+Hauser's Promass measuring system can measure the mass and volume flow of fluids having widely differing characteristics such as:

- Chocolate, condensed milk, syrup
- Oils, fats
- Hops extracts

The Promass system also measures the density and temperature of fluids in order to calculate other parameters that include volumetric flow and solids content, or density units like °Brix.

The Promass measuring system is used in applications wherever mass flow measurement is of critical importance, including:

- Mixing and batching of various raw materials;
- Controlling processes;
- Measuring quickly changing densities;
- Controlling and monitoring product quality.



Promass calculates parameters such as °Brix and °Plato based on its density and temperature measurement, as in this syrup concentrate application.

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