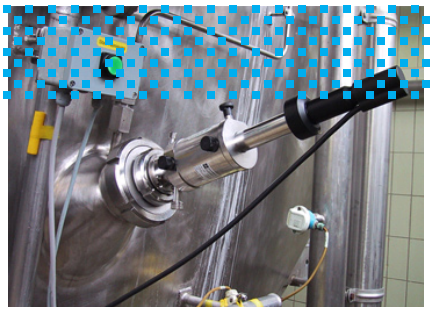
Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

CPC 310 Maintaining pH in Yogurt Production– Food

CPC 310 controls cleaning and calibration of pH sensor in yogurt production



CPA 475 electrode holder installed in vessel

CPC 310 Autocal system with CPS491D non-glass pH sensor

Milk products

Yogurt, a popular choice for healthy living, is derived from milk through a fermentation process in which pH must be controlled for lactic acid formation.

Customer profile

A major producer of ice cream and yogurt has several large production facilities throughout the United States which process milk into flavorful consumer products.

Application description

For the public, yogurt is a popular choice due to its health benefits. It is also used as a filler for adding sweetness and flavor to ice cream. Production takes place in a fermentation process in which lactose (milk sugar) is converted to lactic acid. The quality of the yogurt is therefore dependent upon the control of lactic acid formation.

In the process, milk is heated to 200°F for 10 to 30 minutes depending on the thickness desired. Next, the milk is rapidly cooled to approximately 112°F and mixed with a “yogurt starter”, which contains the necessary bacteria. The dairy mixture is placed into a clean vessel and allowed to ferment for a minimum of 4 hours at 112°F. The longer the fermentation, the more acids will develop, which gives yogurt a tart flavor.

This end point can be measured with pH, which is directly related to the total acidity of the mixture. As lactose converts to lactic acid, the pH will drop to 4.5 to 4.7. When this pH end point is achieved, the mixture is cooled and the reaction stopped.

Failure to control and monitor the pH end point leads to discoloration, excessive free whey and excess or insufficient tartness.

Application challenges

Milk protein represents the single biggest challenge for measuring pH in dairy applications. In the fermentation tank, the milk proteins coat the pH sensor and distort or stop the measurement. Use of glass electrodes is not acceptable in the food and beverage industry.

Instrument description

The Model CPC 310 automates the pH measurement, giving the user the ability to clean or clean and calibrate automatically, and at any point in the process. For problems like milk protein coating, this is a great advantage, and gives the greatest accuracy possible.

In a typical cleaning/calibration program, the sensor is retracted to a maintenance position, out of the process. Strong antiseptic cleaners are pumped to the sensor to remove the coating. Internal pumps with PVDF diaphragms are also used to send buffers for a two point calibration. Should a sensor fail calibration, an error message is sent alerting the user to inspect or replace the sensor. After calibration, the system inserts the sensor back into the process, or keeps it retracted and wet until it is ready for use.

The CPS 491 D ISFET pH sensor is a non-glass electrode that is ideal for operation in viscous gels and slurries. With its Memosens connection, the sensor maintains an inductive connection to the transmitter, therefore wash down and moisture in the process area do not affect the sensor. Memosens technology allows calibration data to be maintained in the sensor.

Measurement principle

The non-glass sensor measures pH using a tantalum oxide FET probe instead of traditional glass. In functioning like a true transistor, the FET chip develops a voltage on its surface depending on the free H+ions. This voltage generates minor changes on the inside of the chip which modifies the resistance between the source and drain of the circuit which makes pH measurement possible. This translates into a safe, accurate and repeatable measurement.

CS0318/24/ae

Endress+Hauser

People for Process Automation

Instruments:
CPC310 Automatic system is shown in the schematic.

For more information, contact
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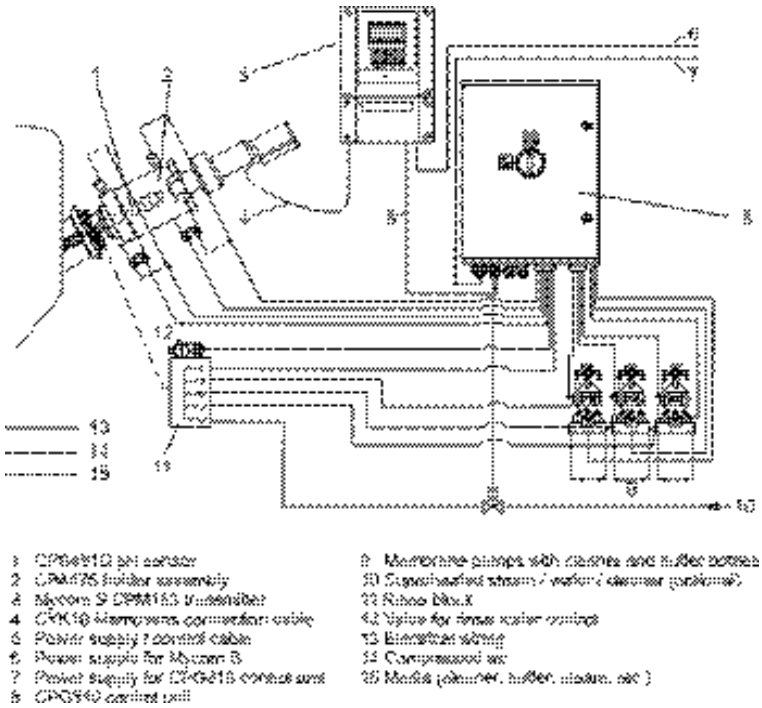

CYC310 system in stainless steel cabinet, includes CPC310, buffer solutions, pumps, transmtter and display unit.

CPA475 electrode holder for automatic insertion and removal of pH probe

ISO 9001:2000 Certified

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