

# CHEESE – STARTER ROOM

Solutions Sales Training Reference

Receiving

Pasteurization

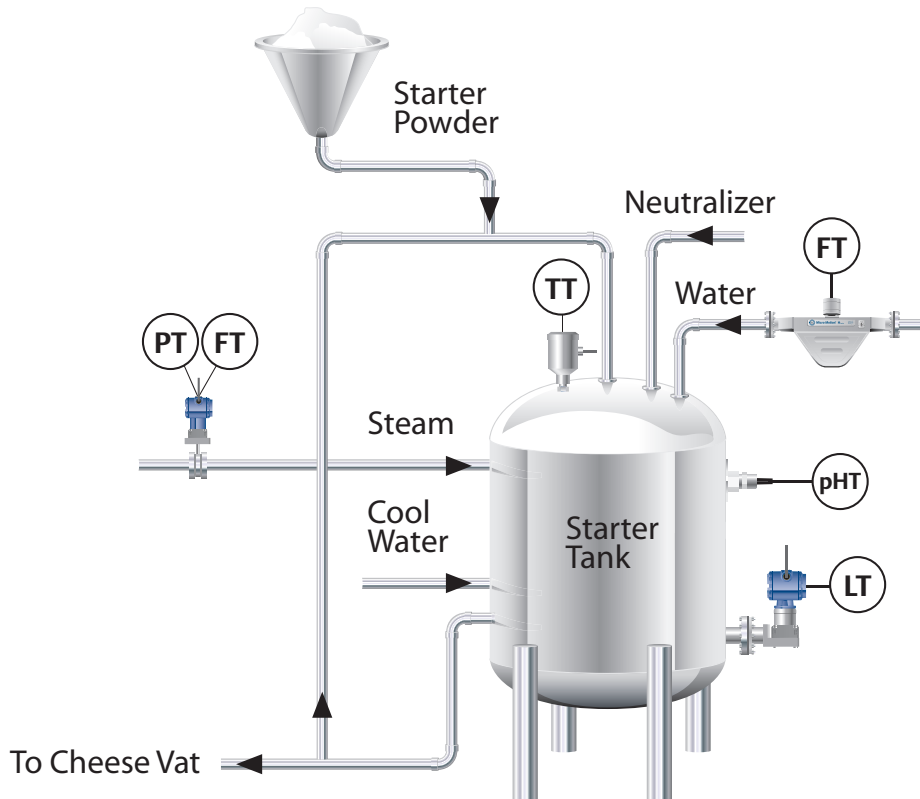
Standardization

Cheese Vat

Starter Room

Finishing

CIP



## Key Objectives:

- Properly grow the starter culture
- Maintain inventory for cheese production
- Loss of starter culture can result in heavy financial loss

## Starter Room Process Description

Starter culture is used in the cheese vat to facilitate curd production and whey removal by producing lactic acid; as acidity increases whey proteins are released and can be removed. Starter is also critical in giving a specific flavor to cheese. The starter culture is produced in a special room with 3-6 starter tanks. A batch process combines water, skim milk or reconstituted milk with a starter powder in a jacketed tank, and goes through an 8 hour cycle of:

- Heating (to 180-190oF)
- Cooling to inoculation or growth temperature (120oF),
- Growth (indicated by a pH rise)
- Neutralization
- Second growth

Growth is indicated by pH, which is carefully recorded. Growth is critical to develop a culture that will give the right taste and efficiently produce lactic acid in the milk/cheese curds.

Disturbances to the performance of the culture result in yield loss and interrupt production. In fact, production failures in the starter room can result in heavy financial loss. Disturbances can happen with airborne infection by yeasts, mold fungi, etc. and the starter room requires the strictest hygiene of any area in the dairy. For this reason the starter room is off-limits to anyone except essential personnel.

The starter culture is continually re-circulated to keep the temperature and pH uniform. Steam is used for heating cycles and cool water is used for cooling. Once the batch is finished it can be sent to the cheese vat for inoculation. The starter tanks are coordinated so a starter culture is always available for the cheese vat. The water, steam and cool water lines are typically shared among all of the tanks since the full cycle is long (8hrs) and these are easily shared. The bulk of the cycle time is on the growth stages.

# CHEESE – STARTER ROOM

## Select Measurement and Control Points in the Starter Room

### Starter pH

The pH of the starter culture is carefully measured and recorded since it indicates the growth of the “bugs”.

### Starter Temperature

Heating and cooling to proper inoculation, or growth, temperature is critical to the development of the starter culture for cheese production.

### Starter Tank pH

#### Control Point Challenge:

This pH measurement determines the amount of growth of the starter culture, and determines when the growth stage is complete.

#### Solution:

An in-line pH measurement is used to give a continuous reading of pH and can be used to automatically initiate the next stage in the starter tank cycle. Some plants use it as a monitor point and manually begin the next stage. This measurement needs to detect very small changes, since stages often go from 4.7 to 4.9 or 5.8 to 6.0.

I have no picture for this product.

### Rosemount Analytical TFS396 TupH Transmitter

- Hygienic real time pH measurement
- Non-glass ISFET sensor
- Built in reference to reduce drift

### Starter Tank Temperature

#### Control Point Challenge:

Carefully control the growth and efficacy of starter culture by careful temperature control.

#### Solution:

Each starter tank carefully controls the heating cycle (pasteurizing to 180-190°F) and growth or “inoculation” stages (70-120°F) to develop a culture that effectively facilitates curd production and gives the proper taste to cheese.



### Rosemount 644 Temperature Transmitter & 68Q Hygienic Sensor

- 3-A and EHEDG sensors
- Sensor matching for best accuracy
- Sensor drift alerts

### Water to Starter Tanks

#### Control Point Challenge:

Accurate dosing of starter culture per gallon (liter) of water.

#### Solution:

The starter tank level measurement is used to indicate the total gallons of water added. This is ultra pure water so magmeters will not work in this application.

#### Recommended Product:

Please refer to “Starter Tank Level.”

## CHEESE – STARTER ROOM

### Starter Tank Level

#### Control Point Challenge:

To carefully measure the level of the tank to prevent spilling and to alert the need for more starter culture from another tank when level is low (when charging the cheese vat). This measurement is also used to infer the total gallons of water added, so the proper ratio to starter powder can be added.

#### Solution:

A high performance continuous level measurement that can accurately infer total volume of water, and can indicate a low level (during vat charging) to initiate a switch to another starter tank. The level measurement also tells how much is left in the tank to indicate the need to switch to another starter tank and avoid interrupting the vat charging process.



#### Rosemount 3051S DP Level Transmitter

- 12 year warranty (10 year stability)
- Lowest total cost of ownership
- Variety of hygienic tank connections

### Cooling Water flow to Starter Tank

#### Control Point Challenge:

Two types of water are commonly used in this two stage cooling process; well water, which has not been mechanically treated (and is not as cool as the chilled water) is much cheaper and is used initially. "Sweet water" which has been cooled to 34°F is then used. Plants often want to know spent well water usage.

#### Solution:

A flow measurement provides spent well water usage, either with a local LOI or as part of the PLC function.



#### Rosemount 8721 Magmeter

- 3A and EHEDG approved
- 0.25% accuracy
- Full diameter; no pressure drop
- Isolated electronics and LOI for long term reliability

### Steam to Starter Tank

#### Control Point Challenge:

Steam used for heating cycles in the starter tank is monitored to detect anomalies in energy use, to alarm any drop in steam pressure or availability, and for overall plant energy management.

#### Solution:

A DP-based mass flow measurement provides total steam use for each starter tank and can indicate a drop in steam pressure or supply. Trending of this information provides visibility to exceptions where steam use is out of line, indicating a problem with the equipment.



#### Rosemount 3095 MF Mass Flow Meter

- Multivariable: flow, P, T, DP
- 1% mass flow accuracy with up to 10:1 turndown
- Pressure and temperature compensation



#### Rosemount 8800MV Mass Flow Vortex

- Multivariable: flow and T
- 2% accuracy with up to 30:1 turndown
- Temperature compensation for saturated steam
- Process isolated removable temperature sensor