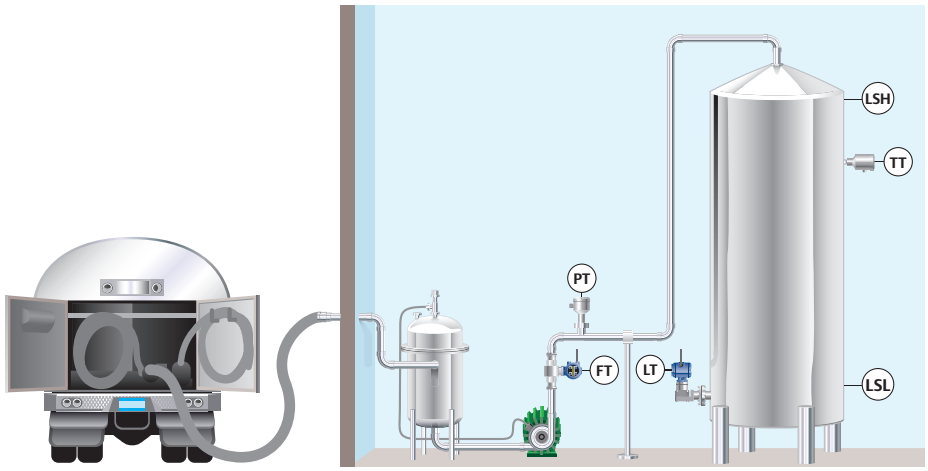
CHEESE – RECEIVING

Solutions Sales Training Reference

EMERSON
Process Management



Key Objectives:

- Record total amount of milk received (custody transfer)
- Confirm milk quality and composition
- Prevent bacteria growth (cooling)

Receiving Process Description

The receiving area of a cheese plant is the same as that of a fluid milk plant. In fact, it is nearly the same in all dairy plants regardless of end product. Milk is transported by tanker trucks to the receiving dock. It is pumped through a tank to eliminate air and sent to raw milk storage. This is a custody transfer operation, so the volume of product is carefully measured and converted to mass. Dairy plants want to measure the total amount of milk received as well as the amount of milk-fat and "solids non-fat" (SNF) which include proteins, lactose and minerals. These numbers are compared to the total production to indicate product loss, known in the industry as product shrinkage. The mass measurement is valuable since the composition of milk varies by season, type of cow, feed, etc. Also, dairies want to be sure the milk has not been diluted with water. The typical composition of water, fat and solids in cow's milk is given in Table 1 above. A lab analysis is always done on the milk to check the composition as well as bacteria count.

Most dairies have up to four receiving bays, with each bay requiring a flow measurement for custody transfer and a pressure line measurement to be sure the receiving pump is working correctly. Line sizes are 3 to 4 inches; newer plants use the larger 4 inch lines to reduce transfer time. Flow rates are kept under 10 ft/sec to avoid cream separation. The milk is pumped to Raw Milk silos, where it is cooled to maintain 4˚C (39˚F). The silo level is carefully measured to provide as much inventory as possible without overflowing the tank. Most dairy plants have a silo alcove, which is an enclosed area at the base of all silos - typically six to ten - for the plant. Raw milk and pasteurized milk are kept distinctly separate on opposite sides of the alcove.

Select Measurement and Control Points in Receiving

Raw Milk Received

This custody transfer application determines the amount of milk, milk-fat and solids a dairy has received. This key measurement is compared to total production to determine product loss, known as product shrinkage.

Raw Milk Temperature

It is critical to maintain the temperature of raw milk at 4˚C (39˚F) to prevent bacteria growth.

Average composition of cow's milk

Constituent	Limits of Variation	Mean Value
Moisture	85.5 - 89.5	87.5
Fat	2.5 - 6.0	3.9
Protein	2.9 - 5.0	3.4
Lactose	3.6 - 5.5	4.8
Ash	0.6 - 0.9	0.8

CHEESE – RECEIVING

Raw Milk Received

Control Point Challenge:
Dairy Plants Use this measurement to determine the amount of milk, milk-fat and solids (solids non-fat, or SNF) a dairy has received. This measurement is compared to the total production to determine product loss, known as product shrinkage. Dairies also use this measurement to optimize the flow rate out of the tankers to reduce reception time and labor costs, since drivers are paid by the hour.

Solution:
A Magnetic or Coriolis flow meter is placed on each receiving line to facilitate quick reception while preventing cream separation. Plants are going to higher line sizes (3 to 4 inches) to speed up transfer time without increasing the flow rate over 10 ft/sec, and magmeters easily scale up to these sizes. Once the lab has analyzed the milk the total fat and solids non-fat (SNF) can be determined.

Rosemount 8721 Magmeter
- 3A and EHEDG approved
- 0.25% accuracy
- Full diameter; no pressure drop
- Isolated electronics and LOI for long term reliability

Micro Motion H-Series Coriolis Meter
- 3A and EHEDG approved
- Direct mass flow and density measurement
- Mass flow accuracy to 0.10%

Raw Milk Temperature

Control Point Challenge:
To maintain the temperature of raw milk at 4˚C (39˚F) to prevent bacteria growth. If the silo temperature is not kept at 4˚C and bacteria growth is allowed, subsequent chilling will stop further development. However, bacteria count in the milk will be higher nd adversely affect the quality of the end product.

Solution:
Most silos have a cooling system to maintain 4˚C (39˚F) in the tank. The milk is gently stirred to keep the temperature uniform, and a temperature sensor is placed on the silo with local indication in the silo alcove at the base of the tank.

Rosemount 4500 Temperature Transmitter
- Designed for Food and Beverage
- Small, stable, and reliable
- Conforms to 3-A and EHEDG standards.
- Withstands CIP and wash-down.

Line Pressure for Receiving Pump

Control Point Challenge:
To protec the pump from operating with an empty tank or pipe.

Solution:
A small, cost-effective hygienic gauge pressure measurement that can reliably indicate loss of pressure in the receiving line to protect the pump.

Rosemount 4500 Temperature Transmitter
- Designed for Food and Beverage
- Small, stable, and reliable
- Conforms to 3-A and EHEDG standards.
- Withstands CIP and wash-down.

CHEESE – RECEIVING

Storage Silo Level

Control Point Challenge:
The storage silos are managed to ensure a steady supply of milk for production while preventing overflow. An overflow will clog the vent, which creates a vacuum if the outlet valve is opened (which most operators will do to rectify the situation). Even worse, turning a pump on at the tank outlet will actually crumple the top of the tank in this overflow situation.

Solution:
A continuous level transmitter with local indication in the silo alcove provides an inventory reading. A high level switch is used to prevent overflow that can clog the vent. A low level switch prevents the agitator from being turned on if the level is below the blades. A lowest level switch is used for emptying the tank, to prevent air from contaminating the milk.

Rosemount 3051S DP Level Transmitter

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