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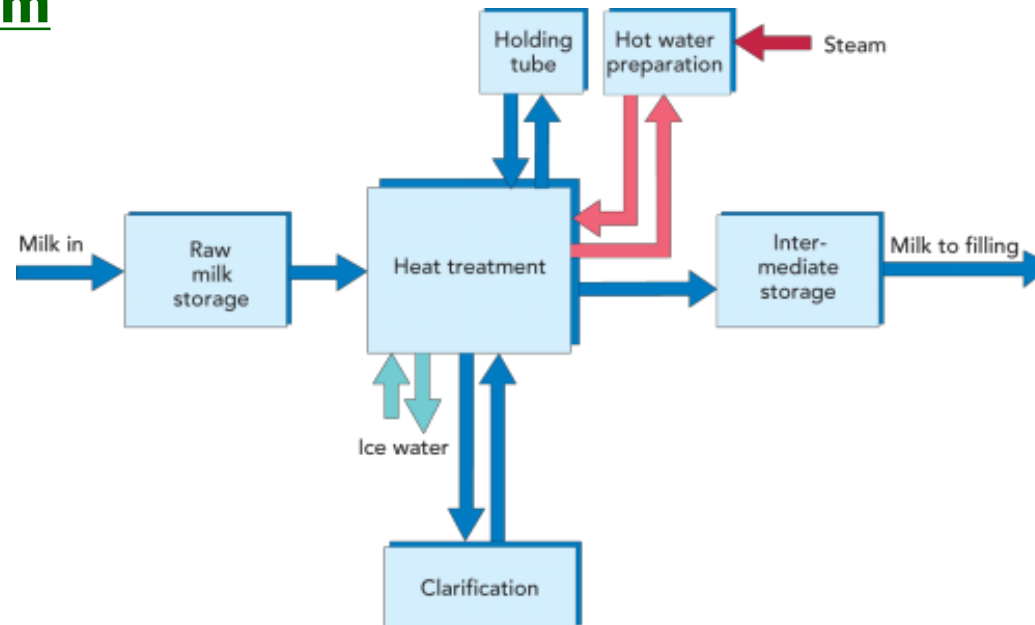
The clear path to operational excellence

Pasteurization Application in Dairy Industry



- ❖ In the dairy, raw milk passes through several stages of treatment in various types of processing equipment(OEM-Products) before reaching the consumer in the form of a finished, refined product.
- ❖ Production usually takes place continuously in a closed process, where the main components are connected by a system of pipes.
- ❖ The process described in this application is General Milk Pasteurization. This process is the basic operation in market milk processing.

❖ Block Diagram



- ❑ In most developed countries where milk is processed into various products, certain requirements are determined by law to protect consumers against infection by pathogenic microorganisms.
- ❑ In India this regulation is yet to be imposed, however with FSSAI being regulatory body for food and dairy products it is expected to impose these norms soon.

A. Heat treatment

The milk must be heat treated in such a way that all pathogenic microorganisms are killed. A minimum temperature/holding time of 72°C for 15 seconds must be achieved.

B. Recording

The heating temperature must be automatically recorded and the transcript saved for a prescribed period of time.

The following equipment are used in a remote controlled process:

- Silo tanks for storing the raw milk.
- Plate heat exchanger for heating and cooling, a holding tube and a hot water unit.
- Centrifugal clarifier
- Intermediate storage tank for temporary storage of processed milk.
- Pipes and fittings for connecting main components and pneumatically operated valves for controlling and distributing the product flow and cleaning fluids.
- Pumps for transportation of milk through the entire milk treatment plant.
- Control equipment for control of capacity, pasteurization temperature and valve positions.

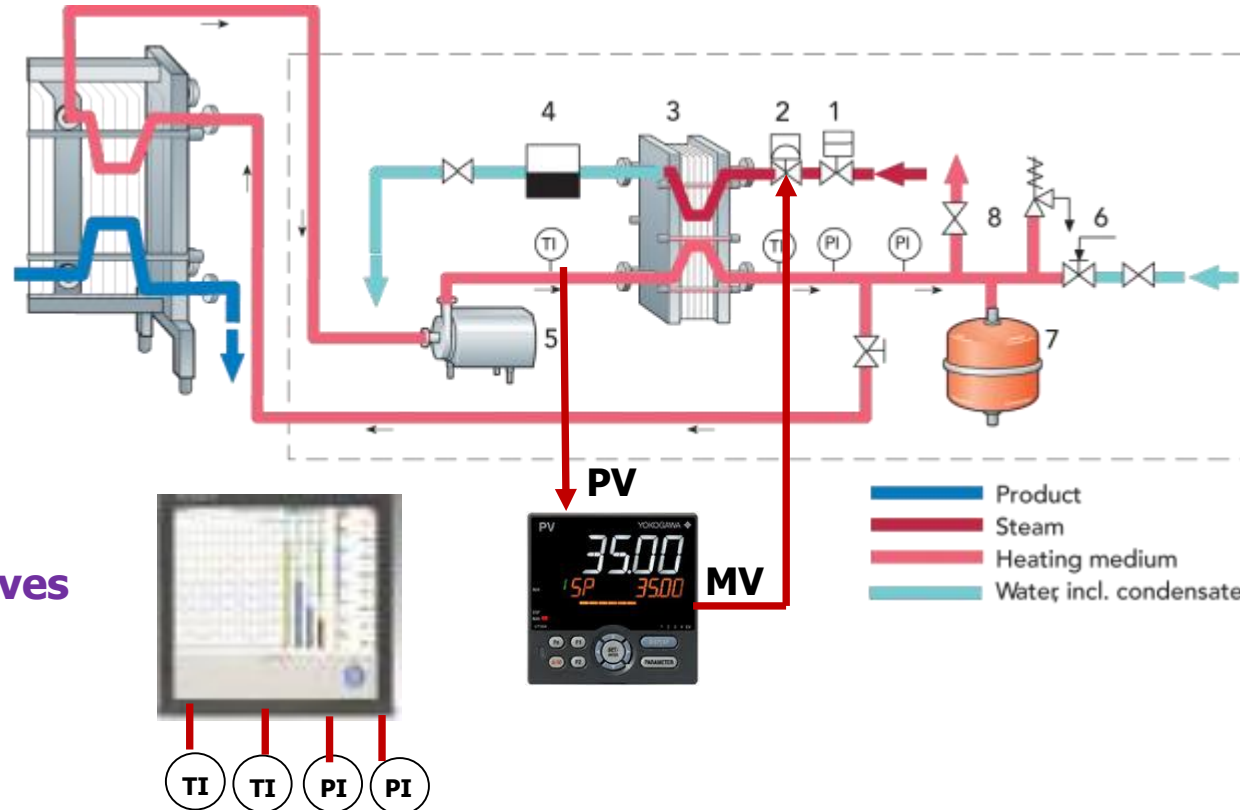
❑ Various service systems:

- Water supply
- Steam production
- Refrigeration for coolant
- Compressed air for pneumatically operated units
- Electric power
- Drain and waste water

❑ Heat exchanger Equipment(OEM-Product)

- ✓ The main aim of pasteurizing milk is to destroy pathogenic microorganisms. To achieve this, the milk is normally heated to not less than 72°C for at least 15 seconds and then cooling rapidly.
- ✓ The plate heat exchanger is most common for market milk pasteurization purposes.

- 1.Steam shut-off valve
 - 2.Steam regulating valve
 - 3.Heat exchanger
 - 4.Steam trap
 - 5.Centrifugal pump
 - 6.Water regulating valve
 - 7.Expansion vessel
 - 8.Safety and ventilation valves
- TI Temperature indicator
 - PI Pressure indicator



CIBD- Deliverables:

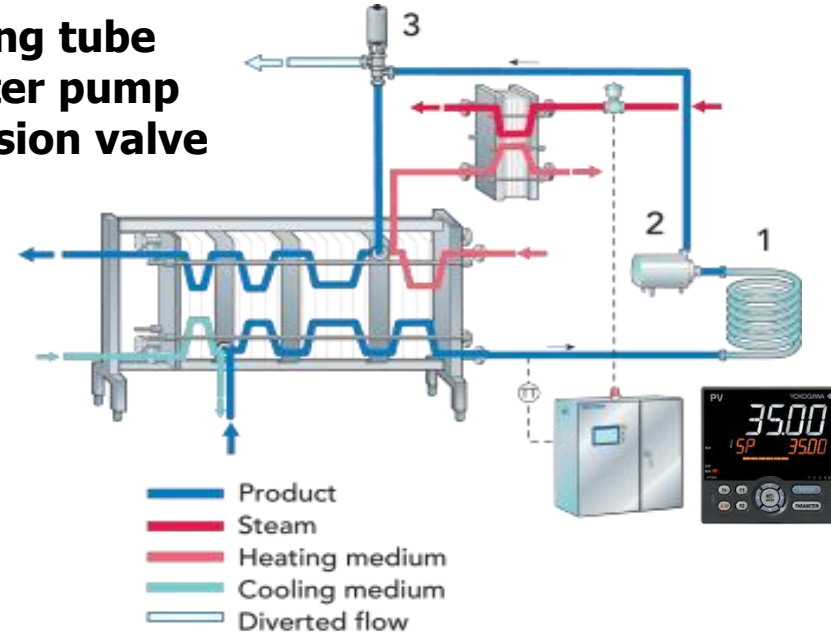
1. UT35A-Single Loop PID controllers
2. GX/DX/FX
3. Juxta-Signal Conditioners/Isolators

- ❖ **Hot water or saturated steam at atmospheric pressure can be used as the heating medium in pasteurizers. Hot steam, however, is not used because of the high differential temperature. The most commonly used heating medium is therefore hot water, typically about 2 to 3°C higher than the required temperature of the Raw Milk.**
- ❖ **Steam is delivered from the steam boiler at a pressure of 600 – 700 kPa (6 – 7 bar). This steam is used to heat water, which in turn heats the Raw Milk to pasteurization temperature.**
- ❖ **The water heater is closed system consisting of a specially designed, compact and simple cassette-type plate heat exchanger (3) equipped with a steam regulating valve (2) and a steam trap (4).**
- ❖ **The service water is circulated by the centrifugal pump (5) via the heater (3) and the heating section of the pasteurizer.**
- ❖ **The function of the expansion vessel (7) is to compensate for the increase in the volume of the water that takes place when it is heated. The system also includes pressure and temperature indicators as well as safety and ventilation valves (8).**

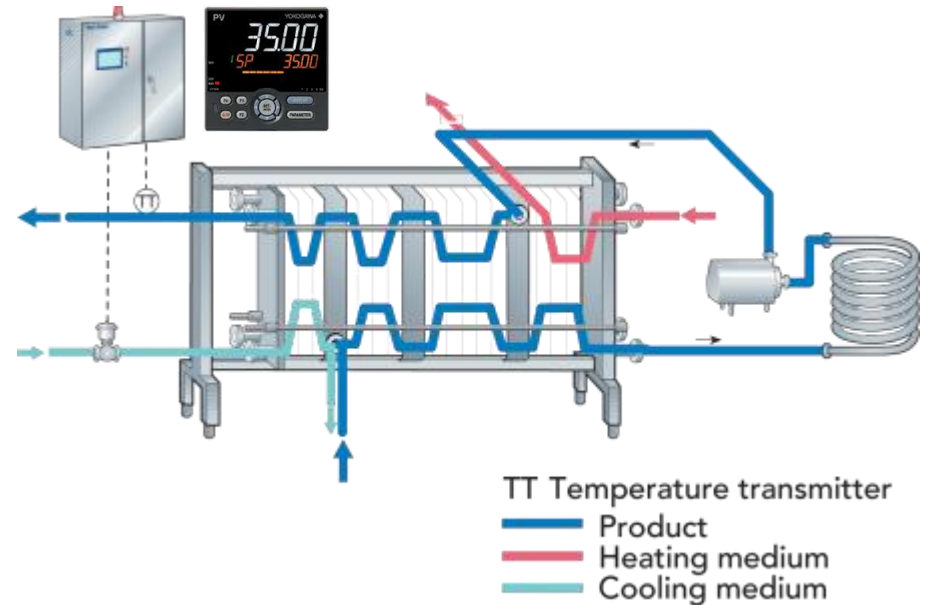
1. Holding tube
2. Booster pump
3. Diversion valve

CIBD- Deliverables:

1. UT35A-Single Loop PID controllers
2. GX/DX/FX
3. Juxta-Signal Conditioners/Isolators



- It is essential that the milk has been properly pasteurized before it leaves the plate heat exchanger. If the temperature drops below 72°C , the unpasteurized milk must be kept apart from the already pasteurized product.
- To accomplish this, a temperature transmitter and **Flow Diversion Valve** are fitted in the pipe downstream of the holding tube.
- Valve (3) returns unpasteurized milk to the balance tank if the temperature transmitter detects that the milk passing it has not been sufficiently heated.



CIBD- Deliverables:

1. UT35A-Single Loop PID controllers
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- The coolant is circulated from the dairy refrigeration plant to the point of use, as shown in. The flow of coolant to the pasteurizer cooling section is controlled to maintain a constant product outlet temperature. This is done by a regulating circuit consisting of a temperature transmitter in the outgoing product line, a temperature controller in the control panel and a regulating valve in the coolant supply line. The position of the regulating valve is altered by the controller in response to signals from the transmitter.
- The signal from the transmitter is directly proportional to the temperature of the product leaving the pasteurizer. This signal is often connected to a **Recorder** in the control panel and recorded on a graph, together with the pasteurization temperature and the position of the flow diversion valve



- ✓ **Universal Controller for various process control parameters. (Flow/Temperature/Pressure/Level...etc.)**
- ✓ **High speed control loop execution(200milliseconds) Guaranteed.**
- ✓ **Ladder programming ability for logic control by interlocks.**
- ✓ **In-built timers eliminate the need of external Timers for HOLD function.**
- ✓ **Temperature control accuracy :+/-0.1°C**
- ✓ **Various options to interface PLC/SCADA**
 - Modbus (Serial/Ethernet)/Profibus-Dp/Cc-Link/Devicenet
- ✓ **Compliance to RoHS/Safety & EMC**