

Beverage (Carbonated Drinks) - Blending

Sugar Dissolving

De-aeration

Blending

Pasteurisation

Carbonation

Filling & Packaging

Utilities

Blending is the third unit in this seven step overview of beverage (carbonated drinks)

Blending Process Description

Precise measurement and mixing of ingredients is critical in the production of carbonated beverages, to ensure both consistent product quality and efficient use of valuable raw materials.

Preparation of Minor Ingredients

Depending on the formulation, the production process may require systems for adding a number of minor flavouring agents, powders and sweeteners to the base mix.

Ready-made concentrates and essences are dosed in liquid form, but crystalline ingredients such as aromatic acids or powdered additives, such as caffeine and aspartame, are mixed with a small volume of water using a powder dissolving unit for accurate dosing into the blending process.

In such cases, a recipe specific quantity of de-aerated water is added to the dissolving unit vessel. The corresponding quantity of ingredient is added to a powder feed funnel, which is connected to a liquid re-circulation pipe. The water is re-circulated at high velocity through a mixing head, which draws the powder into the flow by vacuum. The powder enters at a 90° angle to the water flow, which instantly wets and mixes the two components. Further mixing takes place by re-circulation through the mixer head, after which the liquid concentrate is stored in a buffer vessel prior to dosing.

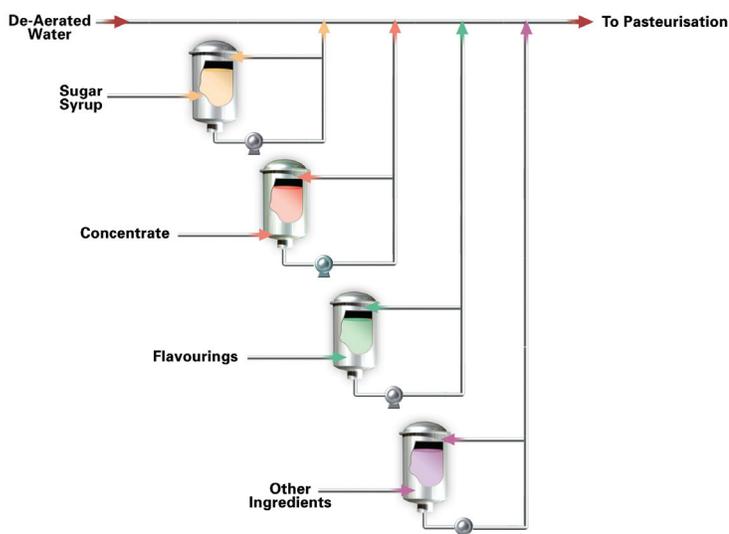
Blending of Final Product

The complexity of the blending process will depend on the number of ingredients to be mixed with the basic sugar syrup and de-aerated water. Dosing into the water stream is performed according to the recipe, using highly accurate mass flow meters for each ingredient stream, with additional measurement to compensate for and correct any variations in feed temperature. If fruit concentrate is used as an ingredient, incoming °Brix levels can be monitored to compensate for any natural variations and ensure the final product remains within specification.

Each of the ingredients is dosed into individual balance tanks equipped with level transmitters. Depending on the design of the system, the ingredients are extracted either using a pump or by inert gas top-pressure from the balance tank. The purpose of the balance tank is to allow the flow and pressure of each ingredient to be fully controlled to ensure accurate dosing.

At the dosing point, each of the ingredients is introduced in counter flow to the water stream in order to maximise the mixing effect. Additionally a static mixing device is included at the end of the blending line to ensure uniform distribution across the width of the pipe, prior to pasteurisation.

Select Critical Control Points of Blending



Ingredient Stream Temperature

Each ingredient stream temperature is monitored at various points through the process for both process control and to enable temperature compensation for consistent °Brix concentration.

Ingredient Balance Tank Level

Liquid level is monitored to confirm the balance tank contents volume and provide fill and empty alarm points for each ingredient stream.

Ingredient Balance Tank Pressure Control (if present)

Control of the inert gas over-pressure applied to the balance tanks ensures a constant pressure for any level of ingredient, delivering a consistent dosing rate to the water stream.

Ingredient Flow - Blending

Accurate measurement of each ingredient stream flow ensures consistent blending to maintain the correct final product specification.

Blended Product °Brix Measurement

Accurate measurement of °Brix sugar concentration of the blended ingredients. This is essential to ensure consistent flavour and shelf-life of the end product.

Improving Beverage Efficiency

Recommended Product Solution

| Ingredient Stream Temperature | Rosemount 644 Temperature |
|--|---|
| <p>Control Point Challenge: Each ingredient stream temperature is monitored at various points through the process for both process control and to enable temperature compensation for consistent optimum °Brix concentration.</p> <p>Solution: Reliable and accurate temperature measurement is achieved by replacing direct-wired sensors to the control system by sensor-mounted temperature transmitters using 4-20mA with HART protocol. RTD Pt-100 offers the highest accuracy and linearity and the use of transmitters provides a clean signal to the temperature controller.</p> |  <ul style="list-style-type: none"> • Universal RTD/Thermocouple • 4-20mA + HART • 0.03°C accuracy • 2 year stability • Direct mount sensor |
| Ingredient Balance Tank Level | Rosemount 3051S |
| <p>Control Point Challenge: Ingredient level is monitored to confirm the balance tank contents volume and to provide fill and empty alarm points for each ingredient stream.</p> <p>Solution: Hygienic pressure transmitters provide accurate vessel hydrostatic head measurement using 4-20mA with HART protocol direct to the control system. Provides level alarm function as well as contents monitoring.</p> |  <ul style="list-style-type: none"> • dP with remote seals • +/- 0.065% accuracy • 4-20mA + HART • Tuned capillary system • 5 years stability |
| Ingredient Balance Tank Top-Pressure Control | Rosemount 3051S |
| <p>Control Point Challenge: Control of the inert gas over-pressure applied to the balance tanks ensures a constant pressure for any level of ingredient and a consistent dosing rate to the water stream.</p> <p>Solution: Hygienic pressure transmitters provide accurate vessel hydrostatic head measurement using 4-20mA with HART protocol direct to the control system. Provides level alarm function as well as contents monitoring.</p> |  <ul style="list-style-type: none"> • dP with remote seals • +/- 0.065% accuracy • 4-20mA + HART • Tuned capillary system • 5 years stability |
| Ingredient Flow – Blending | Micro Motion CMF |
| <p>Control Point Challenge: Accurate measurement of each ingredient stream flow ensures consistent dosing to maintain the correct final product specification.</p> <p>Solution: Micro Motion meters accurately measure the dosing rate of minor ingredients ensuring consistent product specification.</p> |  <ul style="list-style-type: none"> • Mass flow accuracy of 0.05% • In-line density accuracy to +/-0.04 °Brix • Clean-in-place |
| Blended Product °Brix Measurement | Micro Motion CMF |
| <p>Control Point Challenge: Accurate measurement of °Brix sugar concentration of the blended ingredients. This is essential to compensate for any natural variation in ingredients and to ensure consistent flavour and shelf-life of the end-product.</p> <p>Solution: Micro Motion meters accurately measure the in-line °Brix concentration.</p> |  <ul style="list-style-type: none"> • Mass flow accuracy of 0.05% • In-line density accuracy to +/-0.04 °Brix • Clean-in-place |