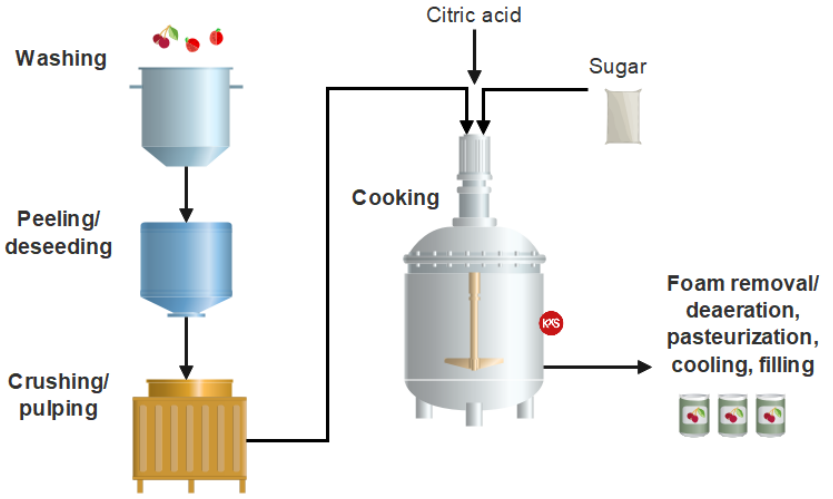
Benefits of R.I. measurement

- Real-time Brix measurement strengthens jam production by allowing critical decisions to be made at the exact moment the process needs them.
- When concentration is monitored continuously, the cooking process becomes predictable and consistent, ensuring that every batch reaches the correct soluble-solids level without delay or guesswork.
- This protects the final product's texture, color, and flavor while maintaining compliance with regulatory definitions of jam.



Overview

Jam, jelly, and marmalade production transforms fruits and berries into stable, high-quality preserves. Achieving the correct sugar concentration (°Brix) is the key to product texture, flavor, color, and shelf life.

Manual sampling delays decisions and exposes the batch to variation. The KxS DCM-20 process refractometer provides continuous in-line monitoring, enabling producers to "cook with confidence" — every batch, every time.

Refractive index measurement applications

Jam cooking process overview

Jam batches typically range from 500 to 3000 kg and follow four main production phases. A typical jam target is: 65–68 Brix at endpoint for optimal gel formation.

The EU requirement is: ≥68% soluble solids for "jam" classification (this is product-dependent).

The DCM-20 measures the full 0–100 °Brix range and maintains accuracy even in viscous, colored, and pulpy matrices.

1. Adding Ingredients

Fruits, berries, pectin, sugar, and water are blended. Frozen berries thaw while temperature gradually increases.

2. Sweetening cooking

Berries absorb sugar until diffusion equilibrium is reached. This step typically occurs below 90°C and determines final texture.

3. Pasteurization

Temperature is raised to 100–150°C for 10–20 minutes to inactivate microbes.

4. Cooling

The jam cools to 20–40°C before discharge; aromas or acids may be added.

During these phases, sugar concentration, temperature, and berry absorption dynamically change.

KxS real-time measurement eliminates uncertainty and ensures the exact endpoint is reached.

Challenges in jam cooking

Jam is one of the most difficult food matrices for optical measurement:

- High viscosity and suspended berries
- High temperature with rapid changes in temperature
- Risk of overcooking (color loss)
- Need for tight sugar control (cost & texture)
- Mixer blades, scrapers, and rotating equipment in cookers

The DCM-20 CMOS camera-based optical design provides stable measurements under these conditions.

KxS DCM-20 installation across all jam cooker types

Jam production equipment varies widely from traditional open boiling pans to advanced vertical and horizontal vacuum systems, and even fully continuous pipe cookers. Despite these structural and process differences, the KxS DCM-20 refractometer integrates naturally into all of them. The design philosophy behind the DCM-20—robust optics, hygienic construction, and flexible mechanical interfaces—allows it to adapt to the thermal, mechanical, and flow conditions characteristic of each cooker type.

In **open boiling pans**, where steam jackets heat the product from below and scrapers keep the surface clean, the probe-type DCM-20 is typically mounted flush to the vessel wall. This position provides continuous exposure to the circulating jam while staying clear of mixer arms. The long probe DCM-20 design allows the sensor's electronics to remain outside the high-temperature zone, protecting the electronics while still positioning the optical head exactly where the measurement needs to take place.

In **vertical vacuum cookers**, which gently cook fruit under reduced pressure, the DCM-20 again benefits from flush-mount installation. The lower vessel wall, where temperature gradients are stable and the jam moves past the sensor in a predictable way, offers ideal measurement conditions. Vacuum processes rely heavily on maintaining

fruit integrity and color; having a real-time concentration signal positioned in the heart of the process ensures nothing drifts outside specification.

Horizontal vacuum cookers, with their spiral heat exchangers and integrated cooling sections, introduce more complex flow patterns. Yet here too, the DCM-20 can be flush mounted without interfering with mechanical scrapers or heat exchange surfaces. These vessels often experience rapid thermal shifts as batches transition from cooking to cooling, and the DCM-20's optics follow these transitions with ease, providing stable Brix readings.

In **continuous pipe cookers**, where jam never stops moving, the DCM-20 is inserted directly into the flowing stream. Installed after the cooking section or in the feed tank, it captures the exact concentration emerging from the thermal zone—an essential point for controlling product consistency before packaging. The straight-pipe installation ensures optimal flow across the prism, preventing coating and enabling fast response times.

Whether flush-mounted on a vessel wall via APV tank bottom flange or inserted directly into a flowing stream, the probe type DCM-20 Brix refractometer remains consistent: the same instrument delivering accurate, real-time sugar concentration in every type of jam cooker used in the industry.

Installation types

Flush mounted on the vessel wall

Inserted into the vessel