

Sugar centrifugation

Continuously operating centrifuges

The Offstein plant of Südzucker AG uses continuously operating centrifuges supplied by the BMA AG. These are used to separate the crystalline suspension in sugar and mother liquor. The sugar can then be dissolved or magmatized in the centrifuge before it is fed into a further processing stage. In this process, the GEMÜ 550 globe valves reliably regulate the feed of wash water and steam into the centrifuges using the GEMÜ 1434 μ Pos positioner.



GEMÜ 550 in foreground
with centrifuge filling device behind it

Overview: Centrifugation of sugar

After the sugar beet has been cleaned and chopped up, the sugar beet cossettes are mixed with hot water in extraction towers and the sugar contained in the cells of the beet is extracted. This produces the raw juice. Burnt lime and carbon dioxide are added to precipitate the non-sugar substances out of the juice, which are then filtered out. The resulting thin juice contains roughly 16 % sucrose and is bright yellow. In several successive evaporation phases, the thin juice is reduced until the dry substance content

of the thick juice, which by this time is golden brown and viscous, is roughly 70 to 75 %. More water is then removed under vacuum and the application of heat in vacuum pans. Here, the water starts to evaporate at just 65 to 70 °C. The low temperatures reduce the colour increase during the crystallisation process. Crystals start to form in the supersaturated sugar solution upon the addition of fine sugar crystals which act as seed crystals. The resulting crystalline suspension is known as the massecuite. Crystallisation is performed in several steps to achieve an optimal sugar yield. In the last crystallisation step, the crystalline suspension is also cooled further in the cooling crystallisers. This results in further crystal growth. The cooling process takes place under continuous movement to prevent settling of the crystals. Next, the liquid part of the crystalline suspension is separated from the crystals in continuously operating centrifuges. To obtain particularly pure sugar, the crystals are dissolved in water again and then re-crystallised.



Brown sugar

Centrifugation of the massecuite



GEMÜ 550 for distribution of steam and water

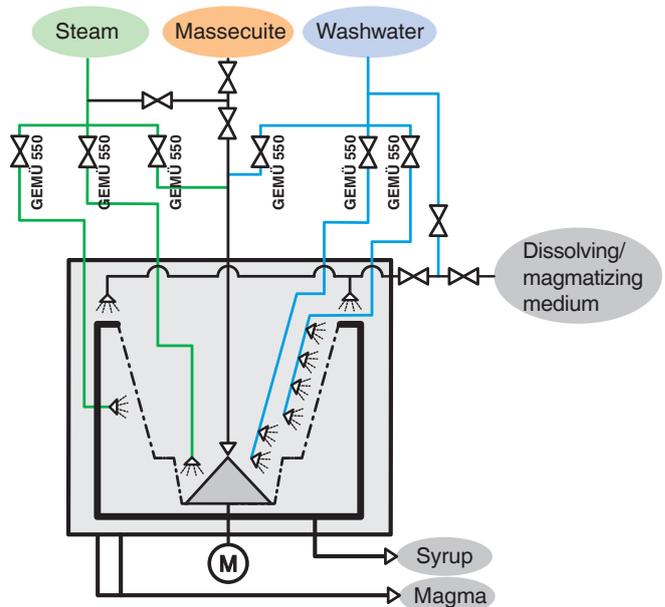
In order to separate the syrup from the crystals, batch centrifuges and continuous centrifuges are used depending on the purity of the massecuite. In the case of continuous centrifuges, the highly viscous massecuite is channelled from the distribution mixer via the filling device and into the centrifuge with the addition of water and steam. Depending on the consistency of the massecuite, the crystals are then separated from the syrup at approx. 1500 to 1900 rpm. The addition of water and steam serves to reduce the viscosity and thus facilitate separation.

Within the product distributor of the centrifuges (inner area of basket), the media are first intensively mixed, uniformly distributed and accelerated. The basket becomes conical towards the top, which causes the crystals to move upwards on the inner wall to the edge of the basket.

From the distribution bell of the product distributor, the massecuite then enters the preliminary separation stage of the basket, in which already a large part of the mother liquor is separated from the crystals (syrup). The sugar crystals are held back on the screen. As the diameter increases, the centrifugal force increases and the separating effect also increases. The remaining mother liquor is washed from the crystals by the addition of water through the jets installed in the centrifuges. The right quantity of water is extremely important to avoid unnecessarily dissolving of the crystals.

Depending on the crystallisation system, the syrup from the centrifuges is re-crystallised in a further stage or fed back into the process for other purposes.

Once the cleaned crystals have reached the end of the basket, they enter the sugar chamber and then a transportation device. If particularly pure sugar needs to be produced, the centrifuged sugar is dissolved in condensate in the sugar chamber and re-crystallised or magmatized (with sugar solution) and then centrifuged again in a downstream centrifuge stage (affinated).



Centrifuge diagram

GEMÜ 550 with GEMÜ 1434 μ Pos

GEMÜ 550 pneumatic globe valves with 1434 μ Pos positioners are used to supply water and steam during centrifugation. The valve spindle is sealed by a self-adjusting packing gland. This provides a low-maintenance and reliable valve spindle seal even after an extended period of operation. The positioner consists of a robust and compact housing with transparent cover in which the controller, travel sensor, switching valves and status LEDs are integrated.



GEMÜ 550 with GEMÜ 1434 μ Pos positioner