Alfa Laval BTUX 510 separator system

Contained steam-sterilizable separation system for commercial production

The BTUX 510 separation system incorporates a unique combination of design features developed specifically to ensure optimum separation and concentration efficiency in downstream biotech applications. It has been designed for use in fully contained processing systems and is sterilizable with steam at a recommended max. temperature of 130°C

The BTUX 510 is a disc-type separator equipped with unique vortex nozzles which offer performance unmatched by conventional nozzle centrifuges. In addition, it has a much higher capacity than similar sizes of solids-ejecting centrifuges because of higher bowl speed.

The BTUX 510 system is also designed for automatic ejection of washed-out solids during the cleaning cycle. This feature makes it particularly suitable for process lines equipped with automated cleaning-in-place (CIP).

The complete system consists of the BTUX 510 nozzle centrifuge, electric motor, solids cyclone, switch gear panel and starter, control panel, valve cluster, flow meter, sight glasses, flexible connections and other related equipment.

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Self-regulating vortex nozzles

The unique vortex nozzles automatically compensate for variations in the feed flow rate or feed solids concentration to ensure a constant concentration of the discharge solids phase.

The self-regulating feature is based on the relationship between the viscosity of the liquid entering the vortex chamber and the effect of its rotation velocity on the pressure drop.

The concentrate enters the chamber of the vortex nozzle tangentially at the periphery, forms a whirl in the vortex chamber and leaves through a hole in the centre of the nozzle. The inlet and outlet pressure of the liquid is similar to normal pressure drops. In principle, these pressure drops are not affected by the viscosity of the concentrate. The pressure drop created by the spin, or whirl, of the concentrate in the vortex chamber is high, if the rotation velocity is high, and low at low velocities. A concentrate with high viscosity rotates at a low velocity, the pressure drop created by the spin is low and more pressure is available to transport a higher flow of concentrate, keeping the concentration low, avoiding clogging. At low viscosity, less pressure is available for the transport of the concentrate, the flow decreases and the concentration is kept up. The vortex nozzle is self-regulating.

Standard design

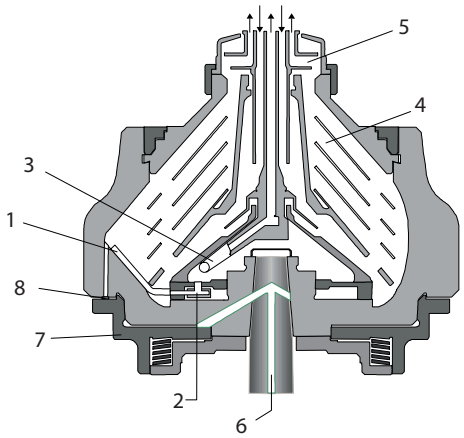
All liquid-wetted parts are made in high-grade stainless steel except the rubber gaskets (EPDM, Viton or FDA approved EPDM rubber).

The gear is splash lubricated without any need for an external lubrication circuit. The vertical driving device and bowl spindle is designed as an easily serviced unit. The entire assembly lifts out in one piece.

The BTUX 510 is designed with connections for flushing above and below the bowl and for cooling of frame parts and cyclone.The standard electric motor is designed for variable frequency drive (VFD).Connections are provided for steam supply and trapping of condensate.The frame conforms to PED Category II. The centrifuge is equipped with sensors for monitoring of bowl speed and vibration level and motor winding temperature.

Working principles

The separation takes place in the disc type bowl which is equipped with concentrate tubes and vortex nozzles. The heavy solids phase is moved outwards by the centrifugal force in to the solids pockets at the bowl periphery and from there through concentrate tubes (1) and internal vortex nozzles (2) into the paring tube chamber, where the concentrate is skimmed off by the paring tube (3) and discharged under pressure. The clarified liquid phase is displaced towards the centre through the disc stack (4). This phase is then discharged under pressure by means of a built-in paring disc (5). The bowl can be opened intermittently during production and/or the cleaning cycle for ejections of solids while the machine continues to run at full speed. The pneumatic (6) controlled valve slide (7) under the bowl bottom opens the discharge valves (8) momentarily, permitting the ejections of solids.



Typical bowl drawing for a vortex nozzle centrifuge. The details illustrated do not necessarily correspond to the centrifuge described.

Options

- Surface roughness of product wetted bowl parts Ra 0.5, Ra 0.8 or Ra 3.2.
- Wing or disc inlet. Disc inlet only with Ra 0.8
- Seal kits in EPDM, Viton or FDA approved EPDM rubber as per CFR 21§177.2600 USP Class VI.

Shipping data (approximate)

Net weight	1,500 kg
Gross weight	1,800 kg
Volume:	4.0 m^3

Main dimensions

Height	1,875 mm
Width	1680 mm
Depth	1,470 mm

Technical data

Max. throughput capacity	10 m^3/h[1)]
Max. solids-handling capacity (wet solids)	3 m^3/h
Feed temperature range	0-100 °C
Feed inlet pressure required (for water at feed flowrates up to 10 m^3/h)	-10 kPa[2)]
Centrifugate outlet pressure available	Up to 600 kPa
Concentrate outlet pressure available	Up to 600 kPa
Installed motor power	37 kW
Noise level	82 dB(A)

1) Actual throughput capacity depends on amount and type of solids in the feed, temperature, viscosity and required degree of clarification.

2) Data valid for water at feed flowrates up to 10 m^3/h.

Utilities consumption

Electric power	20-30 kW[1)]
Operating air	30 Nl/discharge[2)]
Safety water	0.2-2 m^3/h[3)]
Flushing liquid; above bowl, in cyclone & air compensation pipe	0-25 l/discharge[4)]
Cooling liquid, frame	0-1,400 l/h[5)]
Cooling liquid, cyclone	max. 2,400 l/h[6)]

1) Actual consumption depends on exact throughput capacity, centrifugate & concentrate flowrate and applied back pressure.

2) Instrument quality, 500-600 kPa. Actucal consumption depends on CIP-discharge frequency.

3) The bowl should be filled with liquid at start, stop and normal operation. In case process liquid is not available, safety water should be used. Minimum flow shall be 10% above nozzle flow.

4) 100-600 kPa, 300 kPa suggested. Momentary flowrate at suggested pressure up to 1,000 l/h.

5) Max. pressure 100 kPa. Flowrate at 30 kPa 700 l/h.

6) Max. pressure 100 kPa. Flowrate at 30 kPa 800 l/h.

How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com

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