



CHQX 520B - Large capacity nozzle centrifuge

With solids recirculation system for chemical and mining applications



CHQX 520B complete with motor

Alfa Laval separator centrifuges for the chemical and mining industries are available in many different sizes and configurations, each one designed and adapted for dealing with the widely varying separation tasks required. The CHQX 520B-31CG is a nozzle centrifuge optimised for chemical and mining processing featuring a system for recirculation of separated solids.

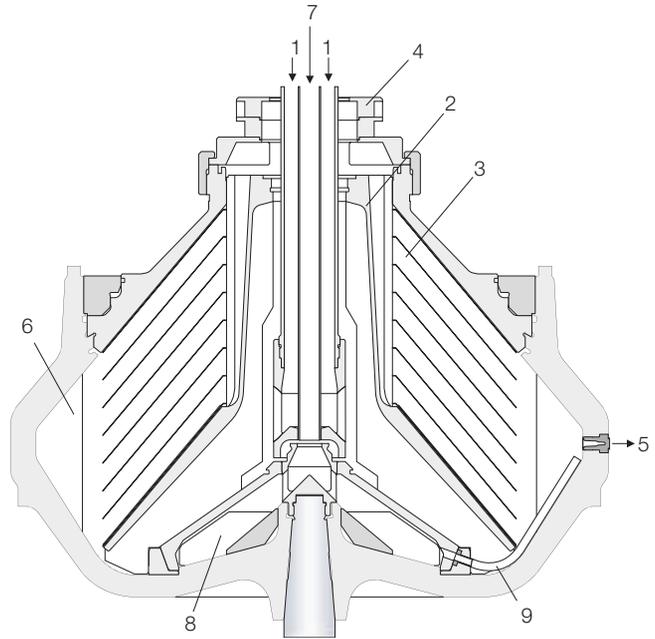
Applications

Thanks to its solids recirculation system, the CHQX 520B is ideal for concentration and classification of solid particles.

The most ideal applications are of two kinds. The first one is a duty in which the solids phase in a concentrated form has shear-thickening properties and therefore necessitates a continuous discharge of the solids phase. The second one is classification of particles according to sedimentation rate, i.e. in most cases particle size, where the continuous flow of the phases is a great advantage. Examples of applications are those in which suspensions with inorganic particles shall be dewatered or fractionated, such as pigments (kaolin and calcium carbonate).

Operating principles

The feed containing the liquid and the solids is introduced to the rotating centrifuge bowl from the top via a stationary inlet pipe (1), and is accelerated in a distributor (2) before entering the disc stack (3). Separation takes place between the discs. The light phase moves through the disc stack towards the centre of the bowl, and is discharged via a power ring (4) which recovers power from the braking of the effluent flow. In the case of a classification duty, the light phase contains the fine particles. The heavy solid particles are collected at the bowl periphery and continuously discharged through the nozzles (5). Filler pieces (6) prevent build-up of the solids between the nozzles. The nozzle flow is collected in a cover around the bowl and further discharged into a pump. Part of the effluent from the pump can then be recirculated back to the nozzles through a pipe (7), a separate recirculation chamber (8), and recirculation tubes (9).



Application examples

	Flow rate m ³ /h	Product conc. % DS	Recovery %
Primary dewatering 80% < 2µm, 8% DS	100	>33	100
Washing/dewatering 100% < 1µm, 14% DS	50	28	100
Washing/dewatering 100% < 1µm, 14% DS	90	22	100
Classification ¹⁾ 27% DS	90	25	85
Classification ²⁾ 10% DS	40	25	43

¹⁾ fine product, 98% < 2µm to 100% < 0,3µm

²⁾ coarse product, 84% < 0,3µm to 61% < 0,3µm

Standard design

Separation takes place in the bowl, which is placed on a vertical spindle. An electric motor mounted vertically drives the spindle near the bottom via a flat belt. Two motors are available: a standard motor for variable frequency drive or a control-torque motor. All metallic parts that come in contact with the process liquid are made of high-grade stainless steel. To recover energy from the discharged nozzle flow, the nozzles are placed in the bowl periphery at a narrow angle from the tangent. The 18 nozzles can be reached from the outside via a hatch in the frame hood, which enables technicians to replace them easily and rapidly without dismantling the frame. The nozzles are made of tungsten carbide, suitable for abrasive solids. The inlet and outlet device is equipped with flanges. The bowl casing has connections for flushing above and below the bowl.

Typical bowl for a nozzle centrifuge with recirculation of solids. The details illustrated do not necessarily correspond to the centrifuge described.

Special features

The CHQX 520B is equipped with a solids recirculation system, which constitutes a unique means of controlling the separation process. Recirculation of solids back to the nozzles does not affect the separation in the disc stack and makes it possible to use a larger nozzle size. Nozzle clogging can therefore be avoided and the reliability improved. Changing the recirculation rate is also a much quicker operation than changing nozzle size if the solids concentration in the feed flow, and therefore also in the nozzle flow, varies. To recover energy from the separated liquid, a turbine-like power recovery ring is fitted at the outlet of the bowl. Circulating oil ensures that the bearings are lubricated. An external pump maintains the necessary pressure.

Technical specification

Throughput capacity	max. 250 m ³ /h ¹⁾
Light liquid flow	max. 200 m ³ /h
Nozzle flow	max. 100 m ³ /h
Bowl volume	120 l
Bowl speed	3750 rpm
Motor speed, synchr. 50/60	1500/1800 rpm
Motor power installed	135/160/200 kW
Centrifugal force inside bowl	max. 6480 g
Starting time	5-8 mins
Stopping time, empty bowl	80 mins
Oil volume	12 l
Feed temperature range	0 - 100 °C
Feed inlet pressure at inlet flange	100 kPa ²⁾
Outlet pressure at outlet flange	0 kPa ³⁾
Sound pressure	89 dB(A) ⁴⁾

¹⁾ Actual capacity depends on particle sizes, densities, viscosity and require degree of separation.

²⁾ At max. process flow rate 180 m³/h. Inlet pressure increases with the flow rate.

³⁾ At outlet flow rate 80 m³/h. Max. pressure decreases with flow rate.

⁴⁾ According to ISO 3744.

Basic equipment

Centrifuge with motor, set of tools, speed and vibration sensors, oil pressure switch, temperature sensors for the main spindle bearing and the motor winding, vibration dampening feet, foundation plate and standard set of spares.

Options

Control-torque motors of four different power ratings are available. Frequency drive is also possible. The bowl is available in two versions, with or without erosion protection. Liquid-wetted gaskets are made of nitrile rubber or food grade EPDM rubber. The centrifuge bowl is available with four different disc spacings. The connections are designed with either DIN or ANSI flanges.

Utilities consumption

Electric power	max. 120 kW ¹⁾
Safety water	23-55 m ³ /h ²⁾
Flushing water	60/460 l/h ³⁾

¹⁾ At max process flow rate 120 m³/h, nozzle flow rate 40 m³/h, and recirculation rate 20 m³/h. Power consumption increases with the flow rate.

²⁾ The bowl should be filled at start, stop and normal operation. In case process liquid is not available, safety water should be used. The above figures refer to nozzle sizes from 1.6 to 2.5 mm and max. bowl speed. The safety water fed to separator should always exceed the nozzle flow by 10%.

³⁾ Above/below bowl. Intermittent flow.

Materials

Bowl body	s.s. 1.4501 UNS S32760
Bowl hood, lock ring and distributor	s.s. 1.4462 UNS S31803
Solids cover and frame hood	s.s. 1.4401 UNS 31600
In and outlet parts	s.s. 1.4401 UNS 31600
Frame bottom part	Cast grey iron
Gaskets and O-rings	Nitrile rubber

Shipping data (approximate)

Centrifuge incl. bowl and motor	4570 kg
Bowl weight	1050 kg
Gross weight	4900 kg
Volume	8 m ³

Optional extras

The CHQX 520B can be fitted with a nozzle monitoring system. This consists of a microphone, which is hit by the jet from each individual nozzle. The signal is then transmitted to a box, which displays the result on an LCD screen. The monitor shows whether the nozzles are clogged or worn out, thus enabling safe operation and high availability. A cover interlocking kit makes it impossible to start the centrifuge unless it is properly assembled. The CHQX 520B can be delivered as a complete system, including valve modules for process liquid and wash water, starter and control system. A conversion kit for rebuilding of the CHQX 520B into the CHSX 520B is available.

Dimensions

