



## X20

For produced water de-oiling



X20 concentrator complete with skid.

The Alfa Laval X20, model OFSX 520S-71CEGPX, is a high capacity concentrator designed for de-oiling of produced water. The design is based on the robust nozzle-type disc bowl centrifuge in order to withstand the demanding conditions in the oil-producing industry. The machine is in compliance with the EC ATEX directive category 2, and therefore Zones 1 and 2.

As an option, the machine can be operated under a positive pressure of 400 kPa, as it has an ASME-approved pressure casing. The X20 concentrator is one machine in the X20 family, which also consists of machines for applications such as heavy crude and tar sand dehydration.

### Applications

The X20 concentrator is designed to reduce the oil content to 15 ppm or lower in produced water. Using a centrifuge for this application is especially suitable for:

- heavy crude oil facilities
- gas production facilities with associated condensate
- deepwater offshore facilities including floating platforms

The compact design makes it especially useful for offshore processing, including at floating platforms where the sea heave may cause problems for conventional technology

## 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. Circulating oil ensures that the bearings are lubricated. An external lube oil pump maintains the necessary pressure.

The centrifuge motor is designed for variable frequency drive.

All metallic parts that come into contact with the process liquid are made of high-grade stainless steel. Liquid-wetted gaskets are made of fluorocarbon rubber.

To recover energy from the discharged nozzle flow, the nozzles are placed in the bowl periphery at a narrow angle from the tangent. The eighteen nozzles can be reached from the outside via a hatch in the frame hood, which allows technicians to replace them easily and rapidly without dismantling the frame. The nozzles are made of tungsten carbide, suitable for abrasive solids. The solids collecting ring is fitted with a wear liner made from polyurethane.

The inlet and outlets are fitted with ANSI flanges. A rotating face seal seals off the bowl casing from the bearings. A cover interlocking kit makes it impossible to start the centrifuge unless it is properly assembled.

## Operating principles

The feed containing the liquids 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 water phase moves towards the periphery, the surplus water is collected in pipes leading towards the centre into a chamber, through the bowl bottom over a gravity ring into the collecting cover, from which it flows out under gravity. This is valid for the atmospheric version. In the pressurised version, the water leaves the centrifuge under pressure by means of a built-in paring disc.

The oil droplets move through the disc stack to the oil/water interface, where they coalesce to form a continuous oil phase that overflows into a chamber and which is pumped out under pressure by means of a built-in paring disc (4). Filler pieces (5) prevent build-up of the solids between the nozzles.

## Special features

The atmospheric version of the X20 concentrator is fitted with a power recovery device on the water outlet. The pressurised version OFSX 520T-71CEGPX has a paring disc, which eliminates the need for an external water pump.

## Basic equipment

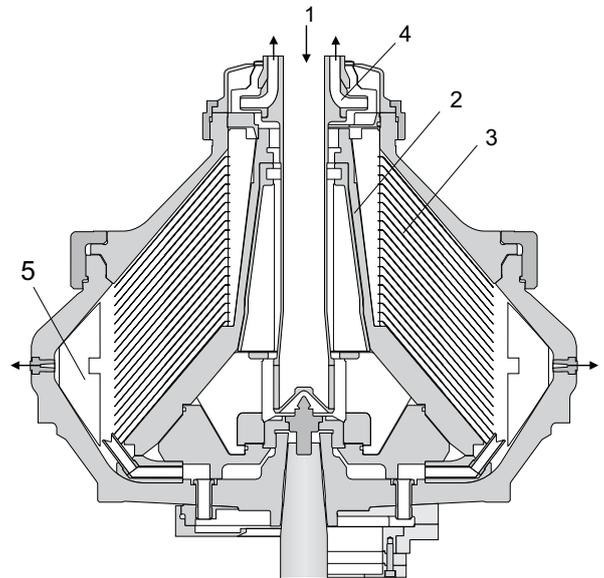
Centrifuge with motor, set of tools, speed and vibration sensors, oil pressure switch, temperature sensors for the main spindle bearing and the motor winding, vibration dampening feet, foundation plate and standard set of spares.

## Options

The X20 concentrator can be fitted with a nozzle monitor. This consists of a sensing device, which is hit by the jet from each individual nozzle. The signal is then transmitted to a box, which displays the result. The monitor shows whether the nozzles are clogged or worn out, therefore enabling safe operation and high availability.

The machine can be supplied with a pressurised bowl casing, design pressure 400 kPag. The separated water leaves the centrifuge under pressure.

It is usually supplied as a functioning unit with a process liquid module, starter and controls. In cases where flammable liquids are processed, an inert gas system is provided with controls integrated in the machine controls.



Typical bowl drawing for a nozzle centrifuge for three phase separation with power recovery device (right hand side) and paring device (left hand side) for the water outlet. Drawing details do not necessarily correspond to the centrifuge described.

## Utilities consumption

Electric power	max. 130 kW <sup>1)</sup>
Safety water	43–55 m <sup>3</sup> /h (190–240 US gpm) <sup>2)</sup>
Inert gas blanketing	approx. 0.4 Nm <sup>3</sup> /h
Inert gas initial purging	4 Nm <sup>3</sup>

<sup>1)</sup> At a process flow rate at 190 m<sup>3</sup>/h. Power consumption increases with the flow rate.

<sup>2)</sup> The bowl should be filled at start, stop and normal operation. In case process liquid is not available, safety water should be used. The figures above refer to nozzle sizes from 1.45 to 2.0 mm and max. bowl speed. The safety water fed to the separator should always exceed the nozzle flow by 10 %.

## Material data

Bowl body, hood and lock ring	s.s. 1.4501 UNS 32760
Solids cover and frame hood	s.s. 1.4401 UNS 31600
Frame bottom part	grey cast iron
In and outlet parts	s.s. 1.4501 UNS 32760
Gaskets and O-rings	Fluorocarbon rubber

## Connections

Feed	3½" flange ANSI
Oil outlet	3½" flange ANSI
Water outlet	6" flange ANSI
Solids outlet	6" flange ANSI

## Shipping data (approximate)

Centrifuge incl. bowl and motor	4,580 kg (10,100 lbs)
Bowl	1,050 kg (2,350 lbs)
Motor	1,180 kg (2,600 lbs)
Gross weight	4,900 kg (10,800 lbs)
Volume	8.0 m <sup>3</sup>

## Technical specifications

Throughput capacity	max. 190 m <sup>3</sup> /h (840 US gpm) <sup>1)</sup>
Water flow	max. 180 m <sup>3</sup> /h (800 US gpm)
Oil flow	max. 10 m <sup>3</sup> /h (44 US gpm)
Nozzle flow	max. 30 m <sup>3</sup> /h (130 US gpm)
Bowl volume	70 l
Bowl speed	3,740 rpm
Motor speed, synchronous 50/60Hz	1,500/1,800 rpm
Motor power installed	152 kW
Centrifugal force inside bowl	max. 6,480 g
Starting time	5–8 mins
Stopping time without brake	80 mins
Stopping time with brake	6–7 mins
Feed temperature range	0–100°C (32–212 °F)
Feed inlet pressure at inlet flange	190 kPa <sup>2)</sup>
Oil outlet pressure at outlet flange	max. 450 kPa <sup>3)</sup>
Outlet pressure of water at outlet flange	0 kPa <sup>4)</sup>
Sound pressure	82 dB(A) <sup>5)</sup>

<sup>1)</sup> Actual capacity depends on particle sizes, densities, viscosity and required degree of separation.

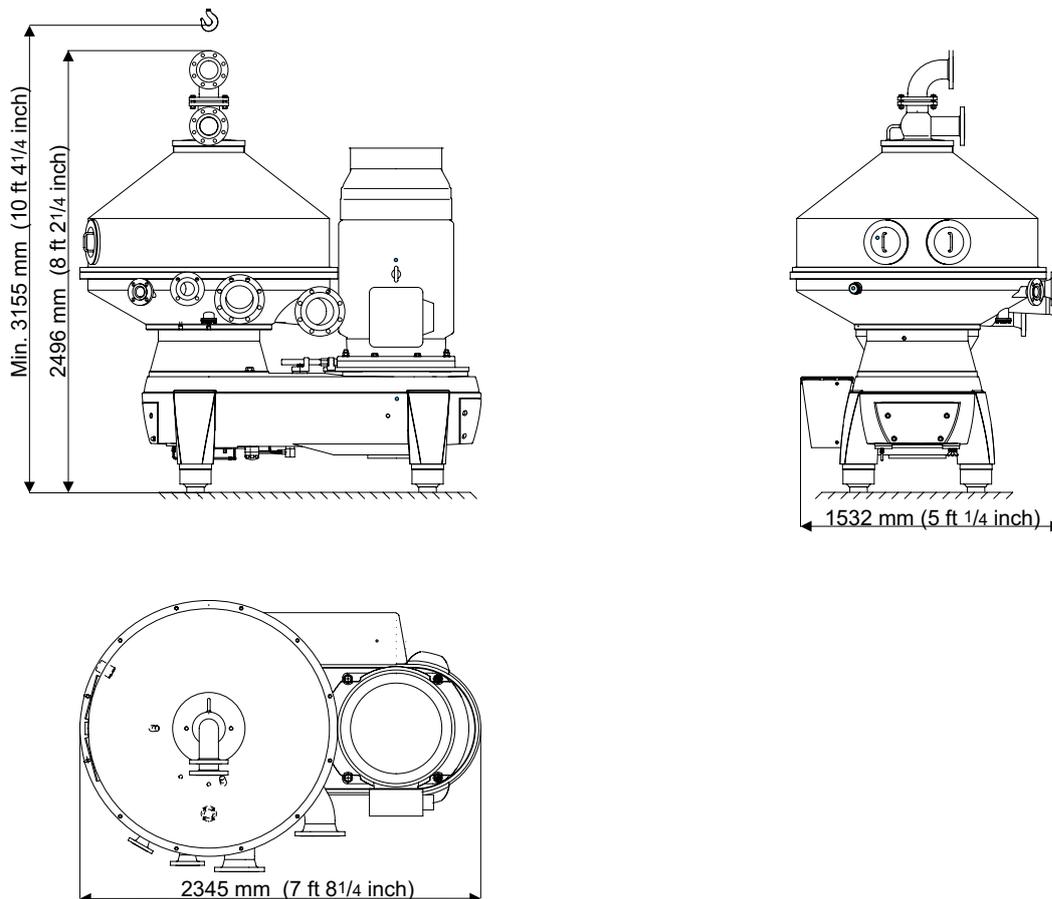
<sup>2)</sup> At a process flow rate of 190 m<sup>3</sup>/h. Inlet pressure increases with the flow rate.

<sup>3)</sup> At an outlet flow rate of 10 m<sup>3</sup>/h. Max. pressure decreases with flow rate.

<sup>4)</sup> Valid for atmospheric version with power recovery device.

<sup>5)</sup> According to ISO 3746.

## Dimensions



**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](http://www.alfalaval.com)