



## OFX 40 Purifier

Very high capacity nozzle centrifuge for crude oil dehydration and desalting



OFX 40 purifier complete

The Alfa Laval OFX 40 is a purifier designed for dehydration and desalting of crude oils with an API gravity down to 10°, including applications in oil sand processing. The design is based on the robust nozzle-type centrifuge in order to withstand the demanding situations encountered in the oil producing industry. It has been proven by the highly reliable Alfa Laval centrifuges of this type that have been used in oil sand processing in Canada since 1978. The machine is in compliance with the EC ATEX directive category 2, and therefore Zones 1 and 2. Its bowl casing is available in two variants, one for atmospheric, and one for pressurized operation at max. 400 kPa(g) and 130°C. The OFX 40 purifier is the largest of the machines in the OFX family, which consists of machines for crude oil dehydration and oily water treatment. The family consists of OFX 5, OFX 20 and OFX 40.

### Applications

The OFX 40 purifier is designed to reduce the water and particle content down to 0.5% BS&W or lower. It is not limited by high water cut on inlet. On the contrary, it can deal with considerable variations in feed composition and constantly obtain a pipeline specification oil quality. Using a centrifuge for this application is particularly suitable for heavy crude oil. The compact design makes it especially useful for offshore processing, including Floating Production Storage and Offloading (FPSO) facilities where sea heave may cause problems for conventional technology. Compared with this technology, the needs for demulsifiers and heat are greatly reduced.

## Standard design

Separation takes place in the bowl, which is placed on a vertical spindle. An electric motor mounted coaxially drives the spindle near the bottom via a center pin coupling. The bearings are drop lubricated. An external pump maintains the necessary pressure. The centrifuge motor is designed for variable frequency drive. The bowl casing for pressurized operation is ASME compatible. 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 24 nozzles can be reached from the outside via a hatch in the frame hood, which enables operators to replace them easily and rapidly without dismantling the frame. The nozzles are made of tungsten carbide, suitable for abrasive solids. The inlet and outlets are fitted with flanged connections according to ASME/ANSI B16.5. A rotating face seal seals off the bowl casing from the bearings.

## Features and benefits

- Robust, compact design with automatic operation
- Easy maintenance, in which the bowl and bearing parts can be removed on site as complete assemblies
- The patented OPTIPHASER™ automatic oil/water interface system for rapid, easy on-line optimization of the separation process

## Basic centrifuge equipment

Centrifuge with motor, set of tools, speed, vibration sensors, temperature sensors for the main spindle bearing, thermistors in the motor winding preventing overload, vibration dampening feet, foundation plate and standard set of spares.

## Centrifuge options

- Two bowl variants: one optimized for heavy crude oil, and one optimized for light oils.
- Bowl casings for atmospheric and pressurized operation.
- Paring discs (outlet pumps) for different capacities
- Touch guarded top part
- Electrical components certified to ATEX or CSA/NEC 505
- Inert gas system with controls integrated in the machine control system for installations where flammable liquids are processed
- Enhanced erosion resistance
- Enhanced corrosion resistance
- COSMOS™ condition monitoring system

## Skid option

The OFX 40 centrifuge can be mounted on a skid, complete with process and utility piping, instruments, valves and

controls to form a functional process system. The skid is built in accordance with Zone 1/Class 1 Div 1 specifications and complies with the ATEX regulations Zone 1 and 2, as well as CSA/NEC. It can be designed for land-based or off-shore installations.

## Basic skid equipment

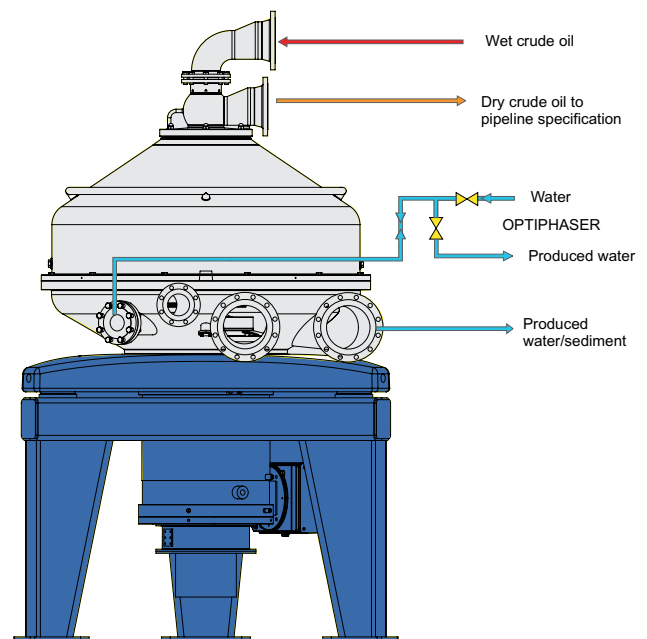
- A complete skid with the OFX 40 centrifuge, drive motor, sample points, instrumentation and an operator panel
- Control and starter panel for safe area location
- Process and utility piping with flanged skid-edge process connections in accordance with ASME B16.5

## Optional skid equipment

- Movable Cleaning-In-Place (CIP) unit
- Inert gas blanketing package mounted on skid
- Explosion proof control and starter panel mounted on skid

## Optiphaser

The OFX 40 purifier is fitted with an OPTIPHASER™ system, which automatically ensures a correct and stable level control of the oil/water interface and therefore a consistent separation performance even at sudden and/or frequent changes in flow rate and/or water cut from 0 – 100%. The system is designed so that water can be imported into the bowl, if necessary. The system is self-contained and requires no operator intervention.



Main flow of OFX 40.

### Material data

Bowl body, hood and	s.s. 1.4507
Lock ring	s.s. 1.4501 UNS 32760
Solids cover and frame hood	s.s. 1.4401/1.4404 UNS 31600/31603
Frame	Cast iron and Steels 1.0038, 1.00045, 1.0545
Inlet and outlet parts	s.s. 1.4401/1.4404 UNS 31600/31603
Bottom part	Cast Iron
Gaskets and O-rings	Fluorocarbon rubber

### Design codes

ATEX EX ia px II 2 C T3 X

ASME Section VIII, div 1 for pressurized version

### Shipping data for centrifuge (approximate)

Centrifuge incl. bowl and motor	9,300 kg (20,500 lbs)
Bowl weight	2,870 kg (6,330 lbs)
Motor weight	1,900 kg (4,200 lbs)

### Operating principles

The feed 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 oil phase moves through the disc stack towards the centre of the bowl, and is pumped out under pressure by means of a built-in paring disc (4). The solids are collected at the bowl periphery and continuously discharged through the nozzles together with some water. The water droplets move towards the periphery to the oil/water interface where they coalesce to form a continuous water phase. The water that does not pass out through the nozzles is collected in pipes leading towards the centre through the bowl bottom. From there, it flows into a chamber from where the water is pumped out under pressure by a paring disc. If the water flow is insufficient to satisfy the nozzle demand, water is imported into the bowl through the paring disc by the OPTIPHASER™ system. Filler pieces (5) prevent build-up of the solids between the nozzles.

### Technical specifications

Throughput capacity	max. 380 m <sup>3</sup> /h (57,000 bpd) <sup>1)</sup>
Nozzle flow	max. 40 m <sup>3</sup> /h (6,000 bpd)
Bowl speed	max. 3,000 rpm
Motor power installed	330 kW (440 HP)
Allowed working pressure (MAWP)	max. 400 kPa (g)
Feed temperature range	max. 130°C <sup>2)</sup>
Sound level, free field	91 dB(A) <sup>3)</sup>

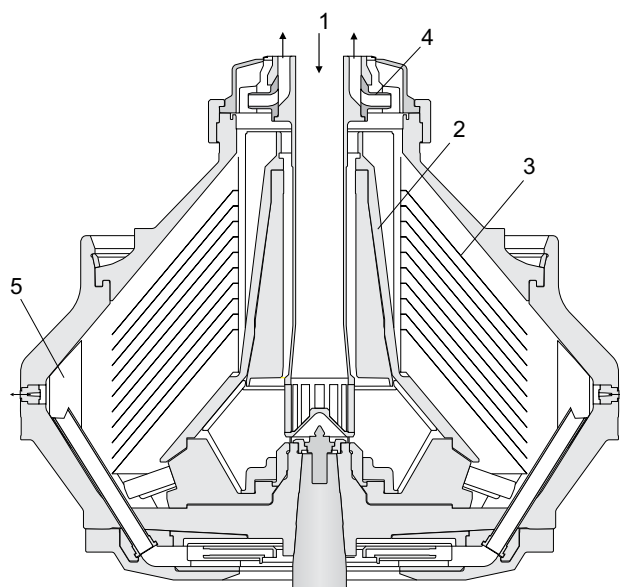
<sup>1)</sup> Actual capacity depends on droplet and particle size distribution, densities, viscosity and required degree of separation.

<sup>2)</sup> May be limited by vapor pressure of the feed liquid.

<sup>3)</sup> At a process flow rate of 300 m<sup>3</sup>/h. According to SS-EN ISO 3746.

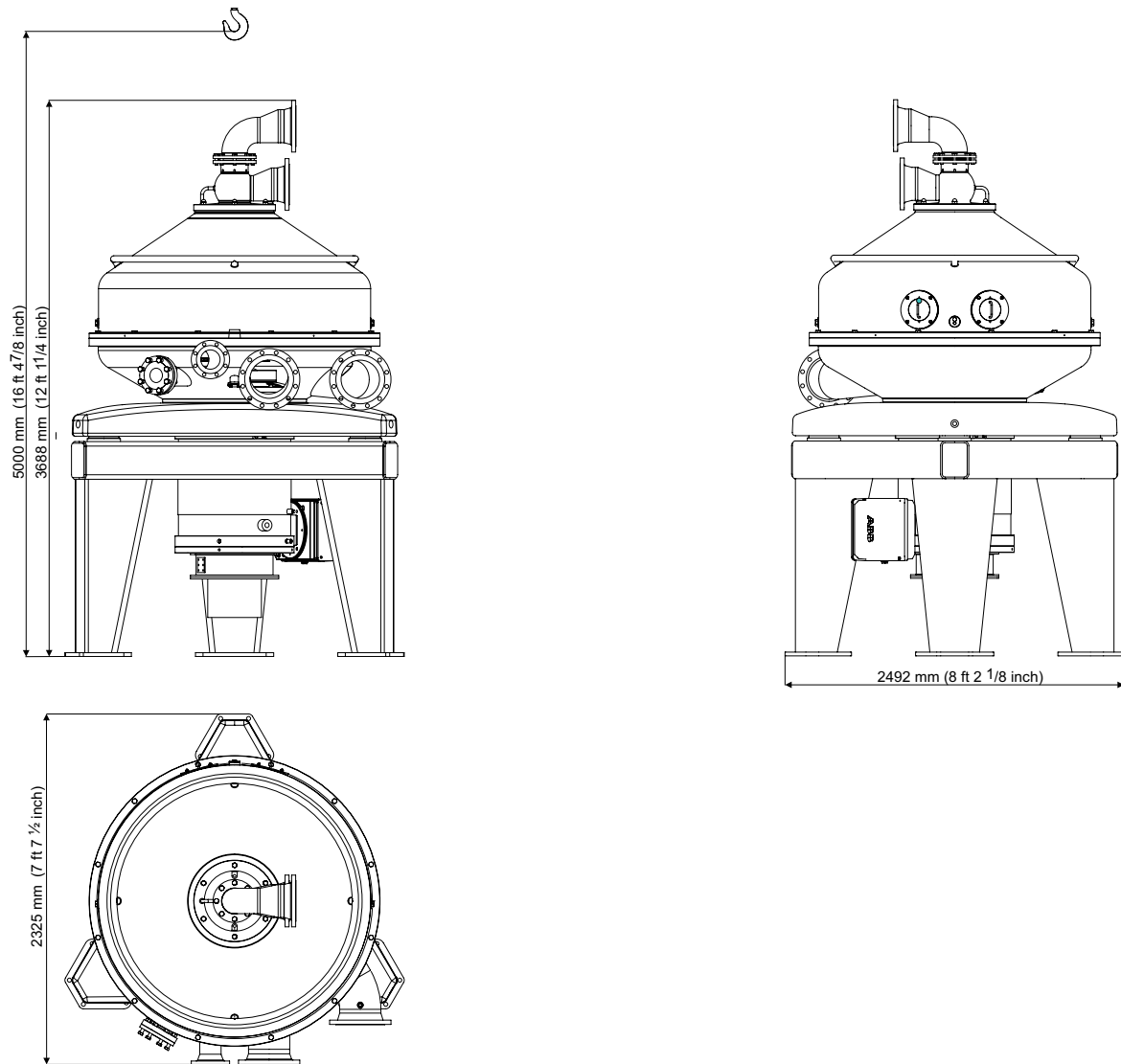
### Skid dimensions for centrifuge (approximate)

Skid length	4,500 mm (14 ft 9 <sup>1</sup> / <sub>4</sub> "
Skid width	4,400 mm (14 ft 5 <sup>1</sup> / <sub>4</sub> "
Skid height	4,200 mm (13 ft 9 <sup>3</sup> / <sub>8</sub> "
Dry weight incl. centrifuge	12,700 kg (28,000 lbs)
Operating weight incl. centrifuge	13,300 kg (29,300 lbs)



Typical bowl drawing for a nozzle centrifuge for three-phase separation. Drawing details do not necessarily correspond to the centrifuge described

## Dimensions



PCHS00072EN 1002

Alfa Laval reserves the right to change specifications without prior notification.

### 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).