Decanter Centrifuge type NX 438 for continuous 3-phase separation

Applications

The Alfa Laval NX 438 decanter centrifuges are designed especially to operate in extremely demanding separation jobs. High flow rates, very high solids content handling and high temperature processing have directed the NX 438 design parameters - to fulfil the very tough conditions within the animal and fish processing industries. Furthermore, the NX 438 provides the combination of an extraordinarily high g-force, high torque capabilities and automated operation.

AlfaDry® Solids Control System

The NX 438 decanters are equipped with an automatic differential speed control system, the AlfaDry® Solids Control System, which keeps the dryness of the solids discharged at an optimal value - according to the set point given by the operator.

The AlfaDry® is an electronically controlled, hydraulically operated system, designed to be set and to respond in the most logical way, seen by the operator.

The AlfaDry® is designed to know the exact load on the decanter at all times, so any fluctuations in the infeed material will be detected immediately, and the corresponding correction of the differential speed will be executed at the very same moment. This does not only secure the solids dryness, - also the solids filling of the bowl is controlled. Hereby the clarification capability of the decanter is kept at its optimum at any time - independent of variations in the infeed material. More information on the AlfaDry® is available in a separate leaflet.

Working principle

The feed suspension enters the decanter at the conical-cylindrical junction of the drum (see fig. 2) through a central inlet pipe in the hollow conveyor shaft. When leaving the inlet pipe, the feed suspension is distributed into the rotating liquid in the drum, and smoothly accelerated to the full rotational speed. As a consequence of the high centrifugal force now applied, the solids will settle out as a deposit on the drum wall, where the screw conveyor continuously transports the solids towards the conical end - the solids conveying capacity being determined by the rotational speed difference between the drum and the screw conveyor, i.e. the differential speed.

The separation of the two liquid phases takes place throughout the total length of the cylindrical part of the drum. An interior separating disc at the cylindrical end ensures that two liquids of different densities can be discharged separately.

The densities of different fats and oils, as well as the densities of accompanying aqueous solutions such as stick-water and glue-water, vary depending on the actual source.

The NX 438 liquid radii of the two phases are set by externally exchangeable overflow-weirs and -nozzles for the respective phases. This enables the setting of optimal thicknesses of the respective liquid layers, depending on the product characteristics, especially density differences.

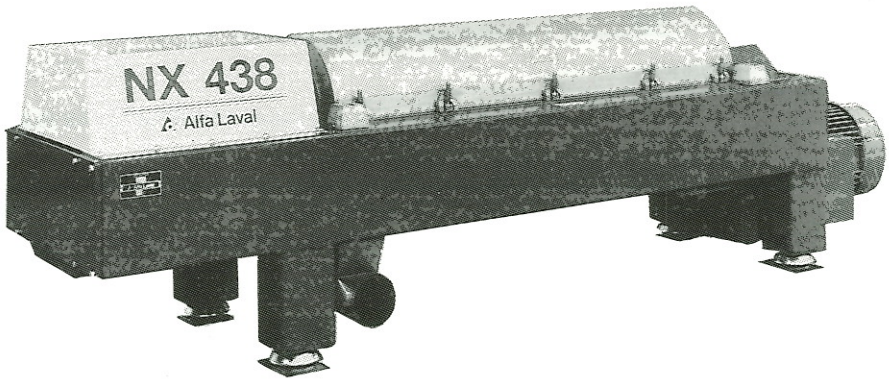

Fig. 1
Alfa Laval
Decanter Centrifuge
NX 438

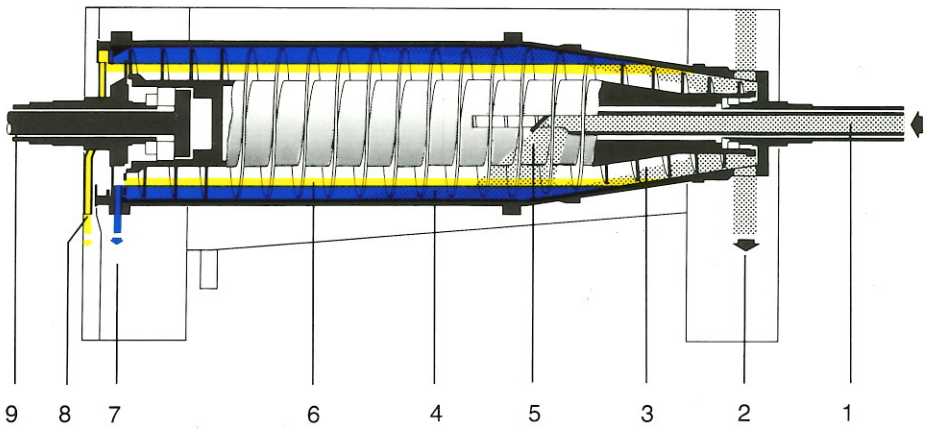

Fig. 2. Functional cutaway of rotor

1. **Hollow drive shaft with stationary inlet tube**
2. **360° erosion protected solids discharge**
3. **Tapered "beach" section of rotor for discharge of solids**
4. **Solids deposited on rotor wall**
5. **Screw conveyor**
6. **"Pond" of clarified liquid**
7. **Exchangeable overflow weirs**
8. **Conveyor drive shaft from gearbox**

The solids are discharged from the conical end by centrifugal force, leaving the conical section through a 360 degrees open outlet. This unique solids outlet allows for extremely high solids quantities to be discharged, and also provides high wear resistance through easily exchangeable wear inserts (saddles). Both the liquid and the solids are collected in special wear protected covers, and are discharged from the decanter by gravity.

Constructional design

The decanter comprises a rotating assembly enclosed in a hinged hood, - both supported by a beam-frame structure.

The stainless steel hood totally encloses the processing part of the decanter centrifuge, and comprises a semi-cylindrical hinged top part and a bottom section incorporating the solids discharge funnel and the liquid outlets.

The rotating assembly main bearings are situated in pillow blocks, aligned directly on the frame structure. The frame also supports the non-rotating inlet pipe, the hydraulic drive of the AlfaDry®, belt guards etc., and is itself placed on 4 especially adapted vibration dampers.

The stainless steel single-flighted screw conveyor is exactly, axially positioned in the stainless steel cylindro-conical drum, which also carries the heavy duty Alfa Laval double planetary gearbox. A direct drive hydraulic motor is connected to the sun-wheel of the gearbox. Through variations in the hydraulic flow to the hydraulic motor, different speeds of the sunwheel and thereby the conveyor are obtained. A hydraulic power station including the AlfaDry® Solids Control System supplies the automa-

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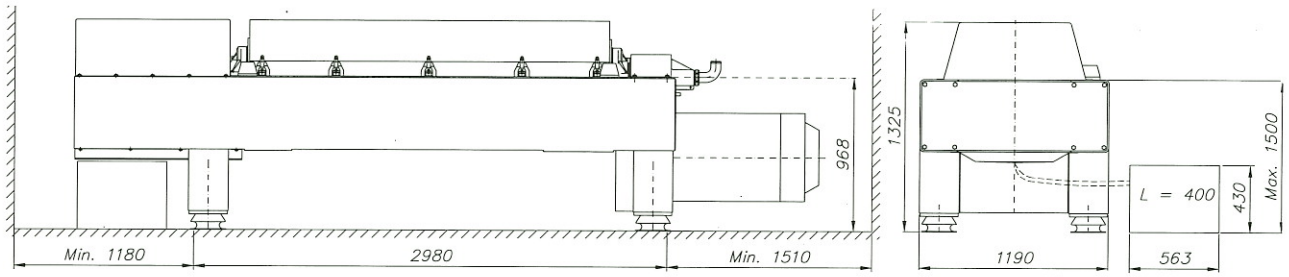
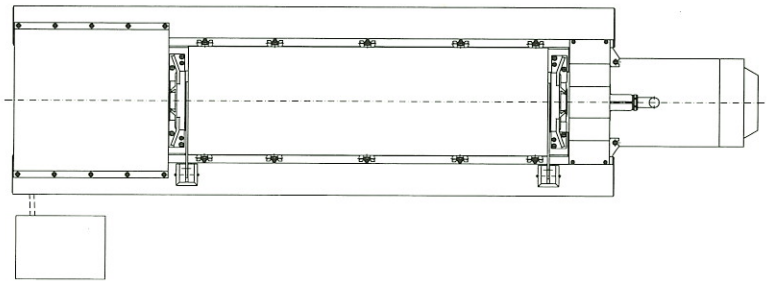


ALL CONNECTIONS MUST BE FLEXIBLE



Connections

Inlet diameter:	63,5 mm/2,5"hose
First liquid outlet:	101,6 mm/4"hose
Second liquid outlet:	101,6 mm/4"hose
Solids outlet flange:	381 x 690 mm

tically calculated hydraulic flow to the hydraulic motor at the gearbox.
The decanter centrifuge is driven by the main motor, which is mounted directly on the frame structure, and axially in line with the drum.

Process optimization
The Alfa Laval Decanter concept offers a variety of process optimization possibilities, which at any time ensure an optimal utilization of the decanter centrifuge. Hereby the NX 438 can be adjusted to suit individual requirements, e.g. by varying:

- rotational speed of drum assembly, i.e. centrifugal force desired.
- differential speed of the conveyor - the analog automatics of the AlfaDry® Solids Control System provide the option for innumerable, different settings in order to suit any product processed.
- liquid radius for light-phase (fat or oil), i.e. total depth of pond, giving the desired balance between liquid clarity and solids dryness.
- liquid radius for heavy-phase (stick-or glue-water). This setting determines the theoretical interphase radius, i.e. theoretical retention time of both light and heavy phase.
- feed temperature, - this parameter is especially important for 3-phase separation, due to vicosity-dependency for fat-/oil phace to temperature.
- feed rate, - the Alfa Laval decanter centrifuge is designed to accept a broad range of throughputs, depending on the products processed.

Performances
The NX 438 decanter centrifuge is very versatile, and is in different executions utilized in a variety of animal and fish processing industries. Actual throughputs depend on variables such as amount and type of solids, temperature, viscosity and degree of clarification and/or solids dryness required. Below figures are advisory only (no guarantee). Alfa Laval representatives will be pleased to give you further information.

Fish press liquid	15 - 30 m³/h
Cooked fish mass	10 - 20 m³/h
Wet rendering press liquid	10 - 20 m³/h

Basic equipment
The standard delivery includes V-belts and pulleys, belt guards, vibration damping supports, safety switches, AlfaDry® Solids Control System, main motor, tools and one set of standard spare parts.

Optional extras
Star-delta starter, vibration switch, and flexible inlet and outlet connections. As part of the complete product Alfa Laval offers beneficial service planning, service agreements and outstanding service facilities.

Technical data NX 438

Rotor speeds	rpm	2575 - 3650
Centrifugal force	g	1675- 3550
Differential speed range	rpm	4 - 55
Static load per foot	N	9000
Main motor	kW	55 - 75
AlfaDry® power station	kW	integrated
Run-up time (star-delta)	min.	2 - 4
Run-down time	min.	15 - 20

Shipping data
NX 438 complete, including motor and AlfaDry® power station:

Net weight	kg/lbs	4200/9200
Gross weight	kg/lbs	4500/9900
Volume	m³/sqft	13/450

Ordering
When ordering, please state voltages and frequency of electrical current.

Alfa Laval FME A/S

ALFA LAVAL FISH AND MEAT ENGINEERING A/S
5, Maskinvej
DK-2860 SØBORG
DENMARK
Tx 221 01 DK
Fax +45 31 67 35 55
Phone +45 31 67 02 04

or

S-147 80 TUMBA
SWEDEN
Tx 102 60 S
Fax +46 8 53 06 84 87
Phone +46 8 53 06 50 00

FME 94115 e

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