Decanter Centrifuge Solutions

Alfa Laval ALDEC range of decanter centrifuges

High-performance decanter for sludge thickening and dewatering

Applications

The Alfa Laval ALDEC range of decanter centrifuges are designed with a focus on cost-efficiency, reliability and easy operation. They are used for thickening and dewatering of sludge from municipal and industrial water and waste treatment plants.

ALDEC decanter centrifuges are capable of handling a wide range of flow rates. They are designed to be efficient, simple to install, easy to maintain and straightforward to operate. Installation, operating and service life costs are minimal.

Benefits

The ALDEC decanter centrifuge design provides a series of practical benefits:

- Reduces sludge volume, which cuts down on transport and disposal costs
- High capacity at small footprint: Compact, modular design saves space
- High performance combined with low energy consumption.

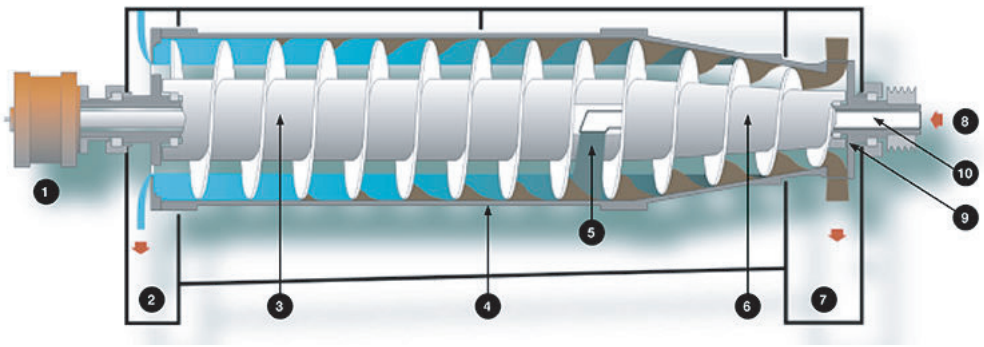
Design

The rotating part of ALDEC decanter centrifuges is mounted on a compact, in-line frame, with main bearings at both ends. Vibration dampers are placed under the frame. The rotating part is enclosed in a casing with a stainless steel cover and a bottom section with integrated outlets for both solids and the liquid being removed.

Working principle

Working principle Separation takes place in a horizontal cylindrical bowl equipped with a screw conveyor (see diagram). The feed enters the bowl through a stationary inlet tube and is accelerated smoothly by an inlet distributor. The centrifugal force that results from this rotation then causes sedimentation of the solids on the wall of the bowl.

The conveyor rotates in the same direction as the bowl, but slightly slower, thus moving the solids towards the conical end of the bowl. The cake leaves the bowl through the solids discharge openings into the casing. Separation takes place throughout the entire length of the cylindrical part of the bowl, and the clarified liquid leaves the bowl by flowing over adjustable plate dams into the casing.



1: Gearbox
2: Liquid
3: Screw conveyor
4: Wall of the bowl
5: Inlet distributor
6: Conical end
7: Solids
8: Feed inlet
9: Discharge ports
10: Feed tube

Features

- Critical parts made of wear-resistant material
- Fully open feed zone for improved separation
- 360° solids discharge to avoid blocking
- Baffle disc provides higher capacity and drier cake solids
- Steep or shallow cone configuration for optimum separation of any type of slurry
- Special conveyor designs to suit particular types of slurry
- Different kinds of wear protection for conveyor flights, to suit any particular processing requirements
- Complete, fully enclosed cleaning-in-place (CIP)
- Floater disc for light particle removal (optional)

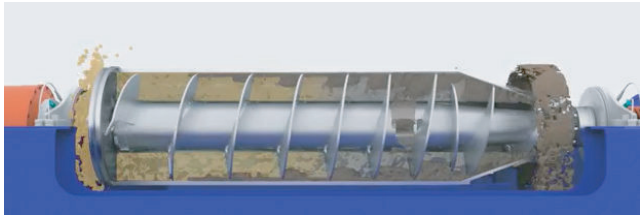


Figure 1. Steep cone configuration

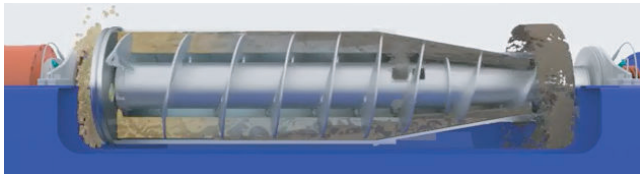


Figure 2. Shallow cone configuration

Process optimization

ALDEC decanter centrifuges can be adjusted to suit specific requirements by varying

- Bowl speed to obtain the G-force required for the most efficient separation
- Conveying speed for the most efficient balance between liquid clarity and solids dryness
- Pond depth in the bowl for the most efficient balance between liquid clarity and solids dryness

Drive system

In all ALDEC decanter centrifuges, the bowl is driven by an electric motor and a V-belt transmission drive. Power is transferred to the conveyor via a planetary or Direct Drive gearbox. For smaller ALDEC decanters, countershaft transmission is an option.

Operation can either be pre-set to a suitable set of parameters, or the difference between the speeds of the bowl and the conveyor can be controlled automatically, with no need for changing belts or pulleys.

Materials

The bowl, conveyor, inlet tube, outlets, cover and other parts in direct contact with process media are all made of stainless steel. The discharge ports, conveyor flights and feed zone are protected with materials that are highly resistant to erosion. Various types of additional optional wear protection can be added, including conveyor flights protected with flame-sprayed hard surfacing, and/or sintered tungsten carbide tiles. The frame is made of mild steel with an epoxy enamel finish. Different materials are available to meet different requirements.

Figure 3. Solids discharge, free from blocking

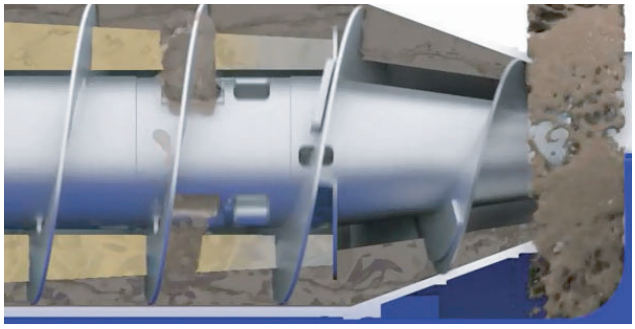


Figure 4. Baffle disc provides higher capacity and drier solids

Figure 5. Sintered tungsten carbide tiles as wear protection for conveyor flights

Figure 6. Flame sprayed tungsten carbide wear protection on conveyor flights

Automation

Each decanter centrifuge in the ALDEC range equipped with a variable frequency drive (VFD) is delivered with the Basic control package as standard. This package is capable of fully controlling operation of the decanter, ensuring the most efficient performance and keeping costs for installation, commissioning, operation and maintenance to a minimum. The controller is also designed to measure the temperature of the bearings, and to monitor vibration levels.

An upgrade to the Plus control package is also available as an option for ALDEC 45 models and upwards.

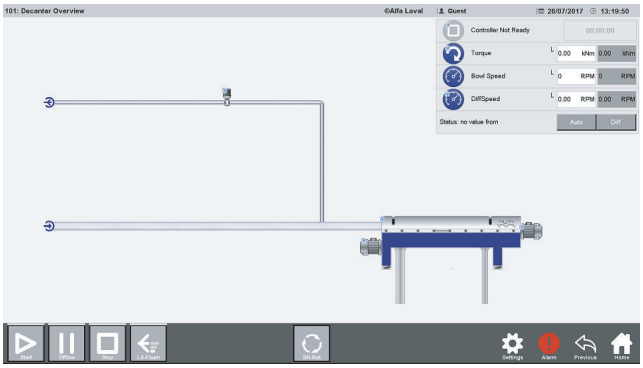
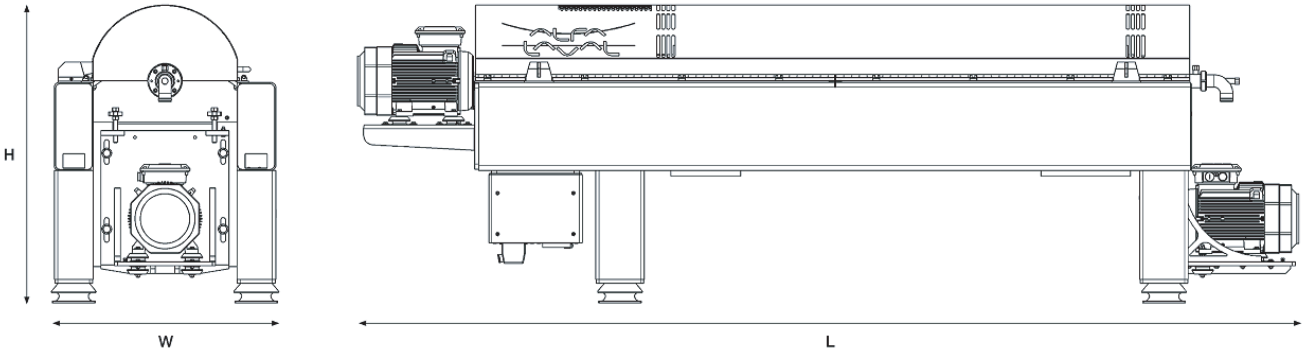


Figure 7. Decanter overview



Technical specifications

Designation	ALDEC 10	ALDEC 20	ALDEC 30	ALDEC 45	ALDEC 75
Length	2150 mm / 85 in	2936 mm / 116 in	3216 mm / 127 in	3998 mm / 168 in	4749 mm / 195 in
Width	580 mm / 23 in	780 mm / 31 in	780 mm / 31 in	990 mm / 39 in	1060 mm / 42 in
Height	762 mm / 30 in	930 mm / 37 in	930 mm / 37 in	1304 mm / 51 in	1376 mm / 54 in
Maximum weight	375 kg / 830 lbs	1125 kg / 2459 lbs	1200 kg / 2660 lbs	2300kg / 5071 lbs	3200 kg / 7050 lbs
Main drive size	4-11 kW / 5-15 hp	11-18.5 kW / 15-25 hp	11-18.5 kW / 15-25 hp	11-22 kW / 15-30 hp	11-45 kW / 50 hp
Back drive size	3 kW / 4 hp	7.5 kW / 10 hp	7.5 kW / 10 hp	5.5-11 kW / 7 hp	5.5-15 kW / 7 hp
Back drive control	CS* or VFD**	CS* or VFD**	CS* or VFD**	CS* or VFD**	CS* or VFD**
*Countershaft fixed differential speed					
**Variable frequency drive					

Designation	ALDEC 85	ALDEC 105	ALDEC 115	ALDEC 125
Length	5076 mm / 200 in	5842 mm / 230 in	6502 mm / 256 in	6901 mm / 264 in
Width	1140 mm / 45 in	1300 mm / 51 in	1450 mm / 57 in	1510 mm / 60 in
Height	2146 mm / 84 in	1696 mm / 67 in	1791 mm / 71 in	1852 mm / 73 in
Maximum weight	4900 kg / 10,800 lbs	5000 kg / 11,023 lbs	6500 kg / 14,300 lbs	8600 kg / 18,959 lbs
Main drive size	22–75kW / 30–125 hp	30-110 kW / 40-200 hp	37-160 kW / 50-200 hp	55-250 kW / 75-350 hp
Back drive size	5.5-22 kW / 7,5–40 hp	15- 30 kW / 30 hp	15-30 kW / 20-40 hp	22-37 kW / 30-50 hp
Back drive control	VFD*	VFD*	VFD*	VFD*
*Variable frequency drive				

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How to contact Alfa Laval

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Alfa Laval MBR membranes

Naturally efficient wastewater treatment for municipal and industrial applications

Introduction

With Alfa Laval MBR membranes, you get trouble-free MBR wastewater treatment at a low operating cost. Based on Alfa Laval LowResist™ technology, they combine minimal cleaning and maintenance needs with low energy consumption and excellent effluent quality.

Applications

Alfa Laval MBR membranes are used around the world in MBR wastewater treatment plants for all forms of wastewater treatment. Some of these applications are:

- Municipal
- Food & beverage including wineries, breweries, dairies, starch, snacks
- Pharmaceutical production
- Chemical production
- Petrochemical processing
- Slaughterhouses
- MBR package plants for municipal and industrial applications

Benefits

The updated version of our MBR membrane modules features a number of improvements that increase efficiency, cut energy consumption and reduce maintenance costs even further. Based on tried-and-tested technology that is used in hundreds of installations over the past 10 years, our new MBR membrane guarantees reliable operation at the lowest possible total cost of ownership.

Every detail of our unique hollow sheet membranes has been specifically designed for the conditions in a wastewater plant. The result is reliable operation and low total lifecycle costs with minimal input needed from your personnel.

Alfa Laval's MBR membrane modules combine our unique LowResist™, S Aerator™ and QuickSwap™ technologies, delivering a range of benefits for both municipal and industrial MBR processes.

LowResist™ — minimizes fouling and energy consumption

Alfa Laval's unique LowResist™ design ensures an ultra-low transmembrane pressure (TMP) under operation. Many of our references operate under pressure from gravity alone. The ultra-low TMP results in Alfa Laval MBR membranes requiring much less cleaning and maintenance than other MBRs on the market as the fouling is mainly surface fouling, which is easily removed, while pore fouling is minimised.

The key to the LowResist™ technology is a design that integrates a high permeability microfiltration membrane with a MBR module construction that limits pressure loss at all stages of permeate production. In the updated model, we have further improved the LowResist™ technology to reduce

TMP even further. The new membranes have open sides, allowing water to flow freely into the permeate boxes. This leads to more even pressure distribution over the membrane, which improves capacity and reduces cleaning needs.

S Aerator™ — minimizes air consumption and ensures performance

Our updated MBR model features the S Aerator™ aeration system. This new, improved system, which is unique to Alfa Laval, minimizes air consumption.

Alfa Laval's new S Aerator™ uses a single-line design, combined with a flush-line.

The design means you can reliably turn the air on and off during operation, allowing you to run your membrane modules with alternating aeration. This alternating scouring reduces energy consumption for air scouring by up to 40% compared to traditional operation – all without impacting the rate of fouling or efficiency of the membrane filtration.

QuickSwap™ — easy membrane replacement

Alfa Laval's unique QuickSwap™ means each pack can be removed individually, minimizing the lifting height required above the membrane module. This means that Alfa Laval's MBR membrane modules are especially suitable for indoor or subterranean installations where extra lifting height means more capital cost.

Membranes are easily replaced thanks to the QuickSwap™ technology. With all of the membranes in a module mounted in packs, an entire pack can be replaced in one operation, instead of having to replace each membrane element individually.

Membranes made for wastewater applications

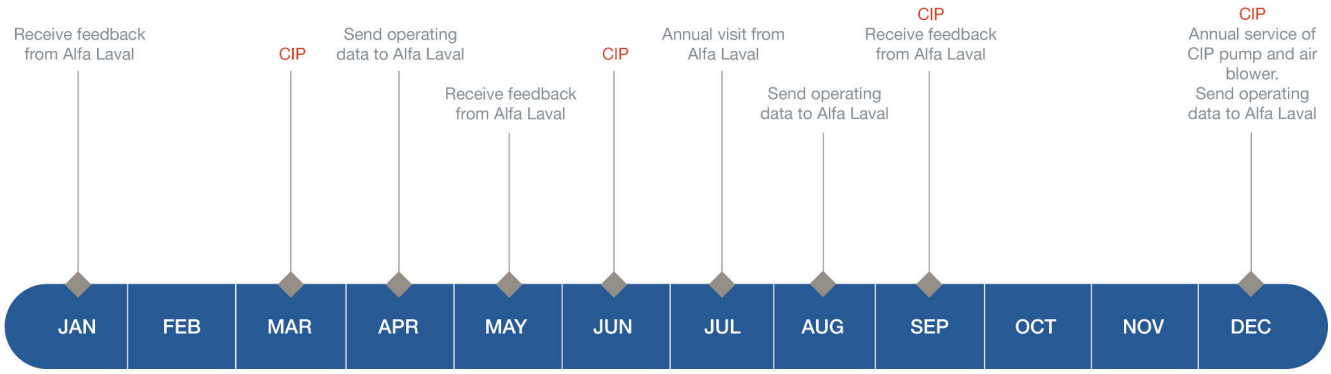
The membranes are the key part of a MBR wastewater treatment plant. We develop and manufacture all membranes used in our MBR modules ourselves to ensure the highest quality and best durability. The membranes are made of chlorine resistant PVDF and have been specifically optimized for use in wastewater applications.

The membranes provide an absolute barrier to bacteria, microplastics and several other pollutants, and the treated water is guaranteed to contain less than 3 mg suspended solids per litre – ideal feed water for subsequent NF or RO treatment and recycling.

Alfa Laval MBR membranes come in a range of sizes, from the MFM080 to the MFM240, ensuring that there is always an Alfa Laval MBR membrane module that can fit your wastewater treatment plant.

MBR membranes with minimal maintenance requirements

Alfa Laval's MBR membrane modules have the lowest maintenance requirements on the market, both in terms of cleaning and equipment service. A typical year in the life of an Alfa Laval MBR membrane with an Alfa Laval performance agreement is illustrated below.



From MBR design calculations to continuous optimization

We are happy to support you at every step of the process, from the initial design stage and throughout the entire lifetime of your plant. With over 150 references worldwide, we have the experienced team to help you reach your wastewater treatment goals. Entering a Performance Agreement with Alfa Laval gives you full peace of mind and guaranteed performance. Alfa Laval's team of MBR experts ensures you get the flux and TSS level specified in your agreement.

With Alfa Laval as your service partner, help is always close at hand. We have service personnel in close to 100 countries, ready to assist you in your local language. And our efficient logistics chain makes sure you get any required spare parts as quickly as possible.

Alfa Laval MBR Membrane technical details

Alfa Laval MBR membrane modules are available in the following standard sizes:

Standard sizes

Module designation	MFM 080	MFM 120	MFM 160	MFM 200	MFM 240
Membrane area:					
m^2[1]	129	193	257	322	386
ft^2[1]	1,389	2,077	2,766	3,466	4,155
Water depth requirement:					
By gravity (mm / in)	2,350 / 92.5	2,880 / 113.4	3,315 / 130.5	3,715 / 146.3	4,115 / 162.0
By pump (mm / in)	1,850 / 72.8	2,380 / 93.7	2,815 / 110.8	3,215 / 126.6	3,615 / 142.3

[1] Other smaller packs are available which could change the membrane surface

Membrane module and operating data

Membrane type	MFP2
Membrane pore size	0.2 µm
Typical TMP during operation	0.01 — 0.04 bar / 0.15 — 0.58 psig
Typical net flux range	10 — 30 LMH / 6 — 18 GFD[1]
Maximum temperature	50°C / 122° F
pH range	1 — 11

[1] Depending on actual wastewater conditions and composition

Membrane module materials data

Module frame	AISI 316 stainless steel
Permeate and aerator piping	AISI 316 stainless steel
Membrane element and spacer	Polypropylene (PP)
Membrane	Polyvinylidene fluoride (PVDF)
Aerator type	Course bubble diffuser
Aerator material	AISI 316 stainless steel
Connection at air inlet and outlet	2” BSP
Connection at permeate outlet	Pipe with OD: 75 mm

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ALDRUM Sludge Thickener – Mini and Midi

Rotary drum filters for small to medium capacity sludge thickening

ALDRUM Midi Drum Thickener with an Outlet Adapter (optional) for sludge hopper and tilting mechanism

Alfa Laval ALDRUM Drum Thickeners are ideal for mechanical thickening of sludge prior to digestion or dewatering, and for reducing sludge volume prior to storage or transportation.

The ALDRUM Drum Thickener comes in two sizes, Mini and Midi, for capacities from 4- 22 m^3/h (18-97 GPM on the basis of 1% dry solids waste activated sludge). They are available as separate components or as complete sludge thickening modules. They are designed to handle sludge extremely gently, providing exceptionally high recovery for nearly all sludge types.

Applications

- All municipal wastewater sludge types
- A wide variety of industrial separation applications, such as paper, solid waste and food
- Fresh water production at waterworks

Benefits

- Compact and robust design
- Long life time filter cloth
- Intermittent flushing saves water
- Very gentle treatment of flocculated feed saves polymer and gives high recovery
- Safe design with bolted, hinged cover
- Clean, enclosed, odour-free solution

Working principles

ALDRUM Drum Thickeners work on the principle of conveying polyelectrolyte treated (flocculated) sludge through a slowly rotating drum filter. The sludge remains in the drum, while the water phase passes through the filter cloth. The sludge concentration can thus be regulated by adjusting the feed rate, angle and speed of the drum.

The drums are equipped with a cleaning system consisting of a spray bar for water. The water consumption is low due to intermittent cleaning of the drum using either potable water, final effluent or treated filtrate.

Optional extras for optimum mixing and separation

An ALDRUM Drum Thickener is usually combined with a polymer mixing valve for thorough mixing and minimum polymer consumption, and/or a flocculation reactor.

Another option is a sludge hopper which comes with an outlet adaptor

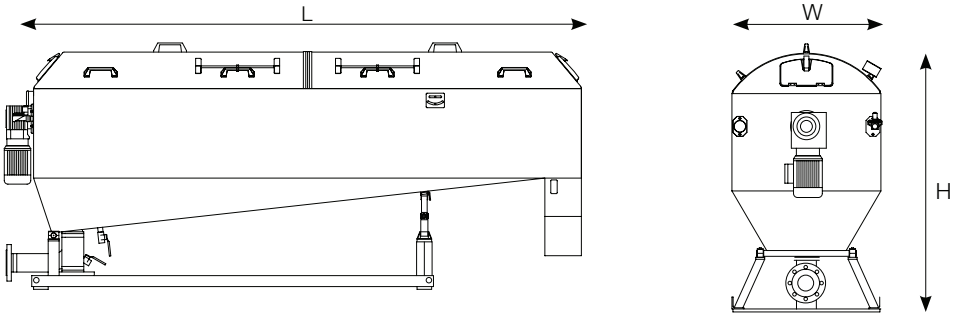
ALDRUM Mini and Midi can also be delivered with a basic control panel for straightforward, user-friendly control of the drum thickener, including level monitoring in the flocculation reactor (if fitted).

- Advanced control: All-in-one control solution. Control of the plant's feed pump, sludge pump and polymer pump, as well as the drum thickener, and level monitoring in the flocculation reactor and the sludge hopper.

Optimisation

The ALDRUM Drum Thickeners can be adjusted to suit individual sludge thickening needs. Optimal thickening is found by varying the feed rate, the polymer type and dosage, flocculation mixer speed, drum speed, angle of the drum and the spraying interval.

Dimensions



	ALDRUM Mini	ALDRUM Midi
Length	2,233 mm/88"	3175 mm/125"
Width	18"/480 mm/18"	750 mm/30"
Height	795 mm/31"	1100 mm/43"
Weight (dry)	300 kg/660 lb.	600 kg/1320 lb.

Materials

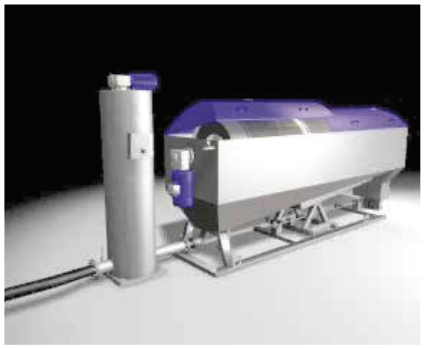
Cover (Colour, RAL 5002)	GRP	Bearings	HDPE
Casing	AISI316	Flanges	Symalit
Drum	AISI316	Spray nozzles	AISI 303
Base frame	AISI304	Filter cloths	Polyester

Materials of other non-wetted parts include:, cast iron, steel, brass

Typical performance*

Type of sludge	Discharge DS (%)	Filtrate quality (mg/l SS)	Polymer consumption (kg/tDS)
Primary	4-12	<400	1-3
Mixed (50% Primary/50% Secondary)	4-10	<400	1-4
WAS (Waste Activated Sludge)	4-8	<400	2-5

* Examples of expected results from an ALDRUM Drum Thickener used on municipal sludge. The results can vary due to a lot of reasons, such as sludge age and the ratio of industrial load. Regarding the filtrate quality, it is not unusual with less than 50 mg/l SS.



Typical layout of an Alfa Laval ALDRUM Mini and Midi Drum Thickener.

How to contact Alfa Laval

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