



## OCU-V - Constant separation efficiency

### Oil cleaning units with vacuum dehydration

Alfa Laval oil cleaning units are fully integrated, modularized oil cleaning systems. They are simple, and very compact solutions offering genuine "start-and forget" operation. A high-speed separator is the heart of the unit and has the unique benefit of removing solids and water simultaneously.

#### Application

The OCU-Vs have been designed to remove contaminant particles, solid impurities and free water, as well as dissolved moisture and gases, from any kind of mineral oils, including:

- insulating oils
- lubricating oils
- turbine oils
- hydraulic oils
- coolant and cutting oils
- compressor oils

#### Features

- High speed centrifuging to ensure separation of particles and free water
- High vacuum for dissolved water and gas removal
- Capable of removing massive water contamination
- Wide operating flow range according to application

#### Benefits

- Parts that ensure particle retention do not require frequent change
- Effective free water removal
- Constant separation efficiency
- Simple operation with user-friendly monitoring control panel
- Worldwide Alfa Laval service

#### Concept

Mineral oils are used in vital areas of the power plant as lubricating, cooling, insulating, sealing, cleaning and control fluids. Keeping the oil clean is therefore of essence to ensure both oil life and correct operation.

The OCU-Vs were developed initially to maintain the effectiveness of, and extend the life of transformer insulating oils.

The transformer insulating oil dielectric power, i.e. the capacity of the oil to withstand high voltages without generating electrical discharges, is severely affected by contamination and has great importance with regards to the transformer safety and efficiency. The oil to be introduced in a transformer



must have solids contamination, humidity, dissolved air and gas contents as low as possible, so that the remaining contamination does not lead to a strong decrease in the dielectric power.

#### Basic equipment

The basic OCU-V comprises:

- an oil feed pump
- an electric oil heater
- a solid bowl separator
- a vacuum pump and tank
- an extraction pump
- a control panel with a PLC for the process control
- complete, fully-assembled and factory-tested module

Optional: stationary or mobile design.

## Working principle

The system consists of two main stages: high-speed centrifugation and vacuum spraying.

## Centrifugation

The oil to be treated is pumped through a mesh filter to the electric heater, where it is heated up to the preset process temperature. A three-way valve permit control of the oil flow either to the separator or to oil outlet line back to the feed tank.

The heated oil then proceeds to the bowl of the separator, where any solid particles and free water are separated out. The separator finally discharges the treated oil into the vacuum tank, under pressure.

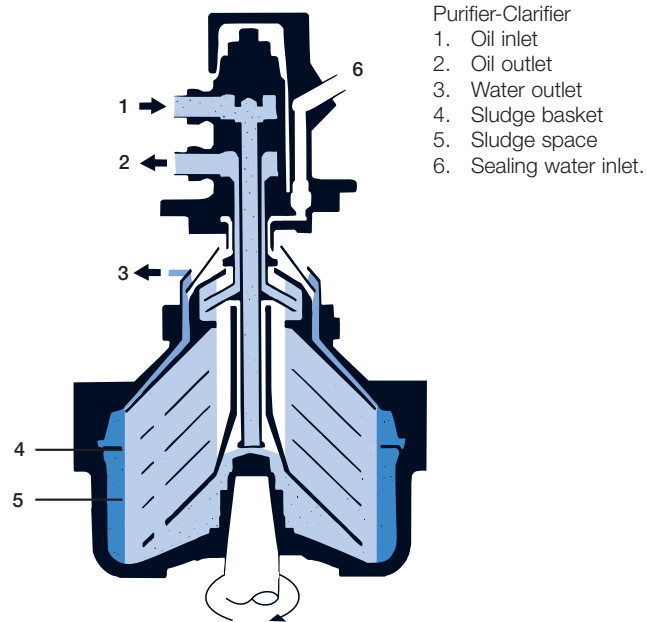


Fig. 1 Solids Retaining Separator Bowl



Fig. 2 MMB 304/305 Separator

## Vacuum spraying

A full-cone spraying nozzle transforms the flow of oil into many small-diameter droplets. This means that a large surface area of oil is exposed to the high vacuum. The dissolved water and gases are then extracted by the vacuum pump.



Fig. 3 Vacuum pump

An external sight glass with a light allows visual inspection of the spray cone and foam level. A foam control device also adjusts the vacuum in order to prevent any damage to the vacuum pump due to the accidental pumping of oil foam. The dehydrated and degassed oil is finally pumped out of the vacuum tank to the outlet by a side channel multicellular extraction pump.



Fig. 4 External side glass and foam detection on the vacuum tank

## System lay-out

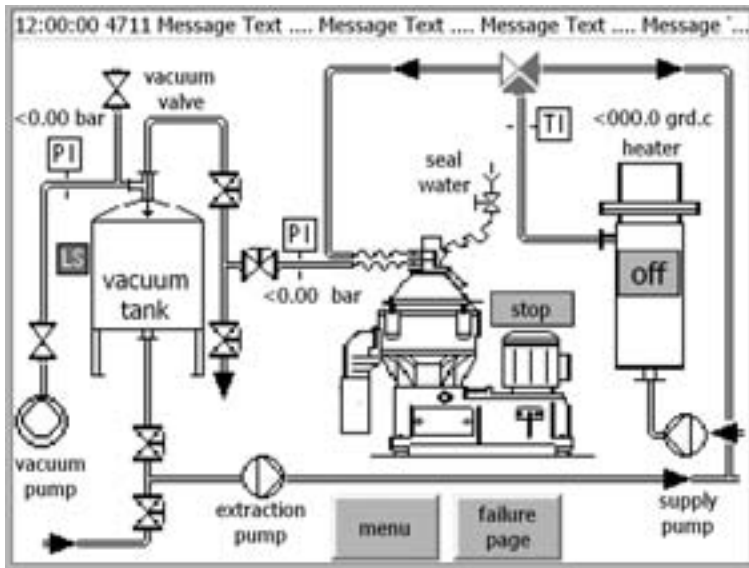


Fig. 5 System lay-out as shown on the control panel

A panel fitted with a PLC controls the process. Vacuum, pressure, temperature readings, discharge pressure and other operating parameters are displayed on the control panel and can easily be adjusted by the operator who has access code to control panel.

The process with its P&ID is shown on the control panel for easy operation and control of the equipment.

## Capacity selection for insulating oil

OCU-V modules have been designed for by-pass operation. Similar to all by-pass processes, the decrease of concentration of contaminants in the transformer tank follows an exponential curve as shown in the figure 6. The effective increase of the dielectric power (KV curve in red) is also shown.

For practical purposes the recommended number of passes is 4-5 of the total volume. Figure 7 facilitates the selection as function of the tank volume and the number of passes during 24 hours.

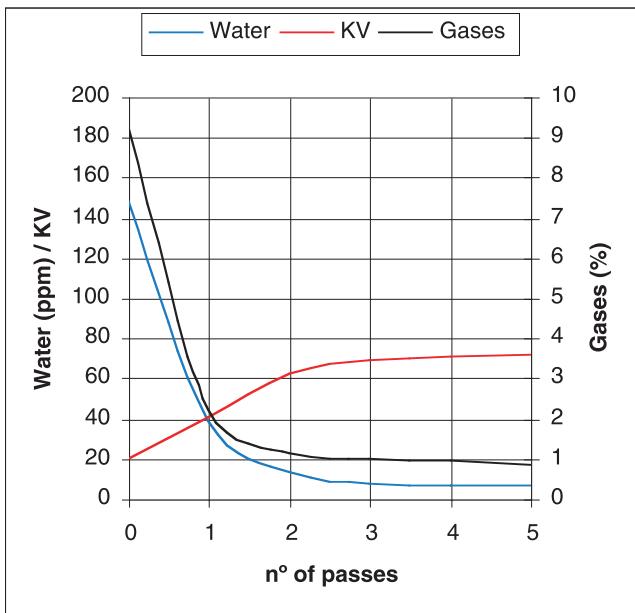


Fig. 6 Performance curves

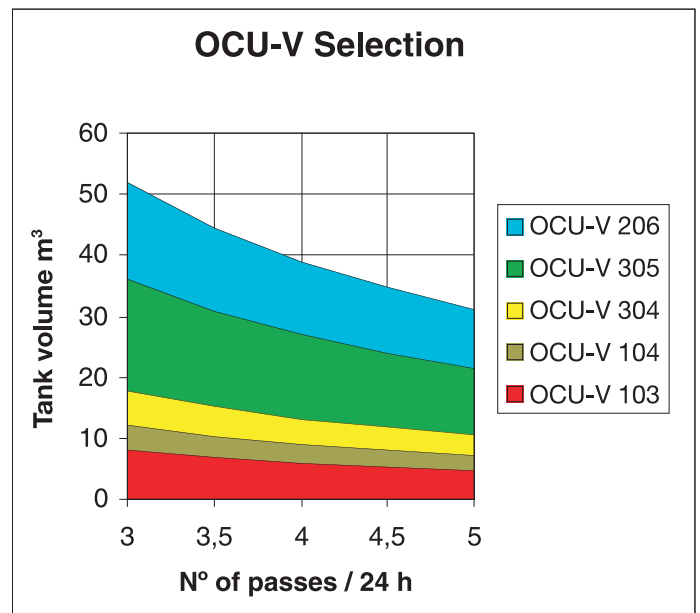
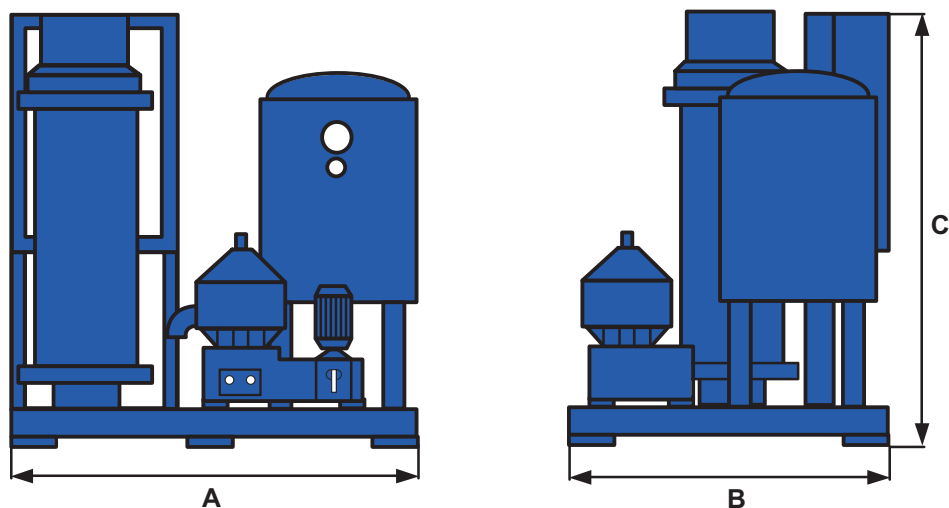


Fig. 7 Unit selection for transformer insulating oil

## Technical Specifications

	OCU-V103	OCU-V104	OCU-V304	OCU-V305	OCU-V206
Treatment capacity (l/h/GPM)	1000/4.4	1500/6.6	2200/9.7	4500/19.8	6500/28.6
Separator model	MAB 103	MAB 104	MMB 304	MMB 305	MAB 206
Inlet pump, Suction height (m/wg)	4	4	3	3	4
Separator, E-Motor (KW, rpm)	0.75/1500	1.5/1500	2.2/3000	2.2/3000	12.0/1500
E-Heater (KW)	18	24	36	72	96
Process temperature (°C / °F)	60/140	60/140	60/140	60/140	60/140
Vacuum pump, capacity (m³/h)	40	40	160	160	2 x 160
Vacuum tank, capacity (dm³)	115	115	300	300	630
Maximum vacuum (mbar)	0.5	0.5	0.5	0.5	0.5
Operating vacuum (%)	90-92	90-92	90-92	90-92	90-92
Spray nozzle	Full cone 120°	Full cone 120°	Full cone 120°	Full cone 120°	Full cone 120°
Vacuum pump, E-Motor (KW/rpm)	1.25/1500	1.25/1500	4.0/1500	4.0/1500	2 x 4.0/1500
Discharge pump, capacity (l/h/GPM)	2150/9.5	2150/9.5	3500/15.4	6500/28.6	9500/41.8
Discharge pump, E-Motor (KW/rpm)	1.1/1500	1.1/1500	2.2/1500	3.0/1500	4.0/1505
Inlet/outlet connections (PN 16)	DN 25/DN 20	DN 25/DN 20	DN 40/DN 32	DN 40/DN 32	DN 40/DN 40
Maximum power consumption (KW)	18	25	44	85	110
Discharge pump, E-Motor (KW/rpm)	-	-	0,75/1420	1,1 / 1420	1,5 / 1420

## Dimensions



	Dimensions (mm/inch)			C*	Weights (Kg/Lbs)	
	A	B	C		Net Empty	Gross Packed
OCU-V103	2200	1400	1810	2100	1100	1450
OCU-V104	2200	1400	1810	2100	1150	1500
OCU-V304	2300	1500	2000	2250	1700	2250
OCU-V305	2300	1500	2000	2250	1760	2350
OCU-V206	3700	2150	2100	2350	4000	4400

\* For mobile unit

PEE00002EN 0610

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

### How to contact Alfa Laval

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