



# FILOIL® 9000

Transformer oil treatment plant

## FILOIL 9000 transformer oil treatment plant

The necessity for transformer oil dehydration and degassing is known for a long time. Transformer oil is used in power equipment where it provides cooling and insulation protection. Over time aggregated moisture, gasses and solid particles can seriously affect these properties. To remove moisture, gasses, and solid particles oil treatment equipment needs to be used. Oil treatment equipment treats oil in the following steps.

### Description of oil treatment process

Oil is heated by electrical heaters with surface efficiency below 1.1 W/cm, with indirect heating to prevent local overheating. Oil at the outlet is filtered by a fine, up to, 0.5-micron filter to filter out solid particles before returning the oil back to the transformer. Equipment is fully automatic, optionally controlled by PLC logic and interfaced with a SCADA system. Numerous safety features are introduced throughout the plant to ensure the safety of the equipment as well as the operating personal. Aeration valves, overheating protection, and automatic level switches guarantee the safety of the equipment as well as its ability to identify a possible risk and to power down to prevent any accidents.

All oil treatment plants possess a positive displacement rotary inlet pump. The outlet pump is a centrifugal closed coupled high suction pump. For dehydration and degassing the rotary vane, a vacuum pump and vacuum booster roots pump are used. Vacuum chamber houses a variable amount of coalescer filters to achieve most efficient treatment of oil. All oil treatment plants have automatic variable oil flow control to maximize user comfort during operation. Vacuum breaking valves before and after the vacuum chamber ensure the vacuum side and the pressure side of the oil treatment plant are completely separated.

### Features

- Electrical heaters with surface efficiency below 1.1 W/cm<sup>2</sup>, with indirect heating to prevent local overheating
- Fully automatic operation of the FILOIL units optionally controlled by PLC and operated via a SCADA system
- High vacuum double or single stage coalesce and ring mesh dehydration and degasification section with stadium design
- Double or single stage vacuum system to ensure high vacuum in the vacuum chamber
- Filter rated up to 0.5 microns prevents particles from entering back into the transformer
- Oil catch pan to prevent accidental spillage, with automatic shutdown control
- All electrical wiring across the FILOIL units conforms to the highest European standards and consists only of high-quality components to ensure the reliability of the unit
- Variable flow rate of oil is an integral part of the FILOIL plant design allowing the users full flexibility during oil treatment
- Optional digital oil flow meter directly integrated into SCADA
- Optional touch panel for easy SCADA operation placed on the electrical cabinet
- Possibility of full manual control
- Integrated anti clog filter system
- Bypass for the possibility to only use heating or filtering capabilities of the plant
- Unique vacuum control to optimize the oil treatment process
- Possibility of online moisture measurement probes on inlet and outlet integrated into SCADA
- Possibility of remotely access to the unit via integrated GSM modem
- Commissioning and FAT on location
- SCADA system localized to most popular languages
- Full set of documentation also in electronic form available for download

### Extra options

- Standard 20-foot sea freight container
- Road worthy trailer modified to house FilOil unit
- Set of spare parts for 2 (up to 10) years of operation
- Commissioning on site
- Supervision for operation on an energized transformer
- Extra vacuum system for transformer evacuation
- Extra vacuum system for parallel transformer evacuation
- 2 flexible houses with flange or quick coupling connection
- Power cable with cam lock system with variable length
- Remote access module
- Online moisture measurement

## Performance

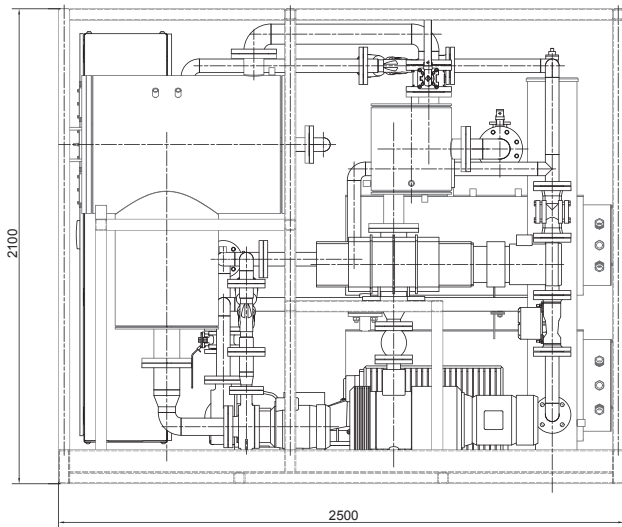
FILOIL double stage high vacuum equipment is used to decrease total water content (ppm) and gasses present in transformer oil. Highly efficient dual stage vacuum system with vacuum chamber housing highly effective coalescer system is an ideal solution for dehydration and gas removal. Water content is decreased to less than 5 ppm according to the IEC 60814 or ASTM D1533 standards. Total gas content is reduced down to less than 0,1% according to the IEC 60567 or ASTM D2945 standard. Particulate matter is lowered to less than 99% of particles over 1.0 microns. Dielectric breakdown is improved above 60 kV. With the use of a regeneration module acidity and interfacial tension are also improved to acceptable values by the IEC 60422 standard.

Property	Starting value	One pass	Three passes	Multiple passes
Humidity (ppm)	< 50 ppm	<= 5 ppm	<= 3 ppm	<= 1 ppm
Gas removal (%)	< 10%	<0,2%	<0,1%	<0,1%
Particulate matter (micron)	na	98% of over 0,5	98% of over 0,5	98% of over 0,5
Dielectric breakdown (kV/2,5mm)	30	>=65	>=85	>=85

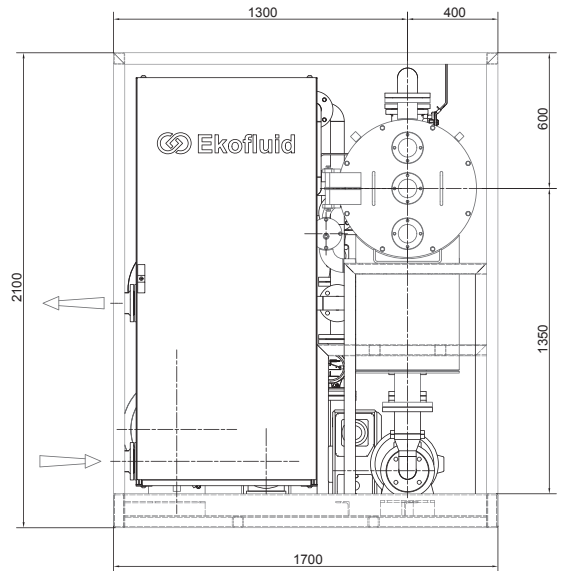
## Technical data

Property	Unit	Value	Property	Unit	Value
<b>Dimensions</b>			<b>Vacuum</b>		
Length	mm	2500	Vacuum capacity	m <sup>3</sup> /h	400-600
Width	mm	1700	Vacuum booster	yes/no	optional
Height	mm	2100	Vacuum	mbar	0,1 - 10
Weight	kg	2600	Oil mist separator	yes/no	optional
<b>Wheels dimensions*</b>			<b>Second vacuum line*</b>		
Length	mm	2500	Vacuum capacity	m <sup>3</sup> /h	400 - 2500
Width	mm	2200	Vacuum booster	yes/no	optional
Height	mm	2600	Vacuum	mbar	0,1 - 10
Weight	kg	3300	Oil mist separator	yes/no	optional
<b>Oil throughput</b>			<b>Control</b>		
Oil flow min	l/h	1500/2000/2500	Manual control	yes/no	yes
Oil flow max	l/h	8000/9000/10000	<b>Additional configuration*</b>		
<b>Piping</b>			Interchangeable inlet/outlet	yes/no	optional
Oil inlet	DN	40	Bypass valve for pumping	yes/no	optional
Oil outlet	DN	40	Sampling valves	yes/no	optional
Transformer vacuum outlet	DN	80	Hot oil spray	yes/no	optional
Operating temp	°C	50 - 90 (100)	<b>Sensors*</b>		
<b>Filters</b>			Moisture on inlet/outlet	yes/no	optional
Inlet coarse	micron	150	Gasses on outlet	yes/no	optional
Pre filter	micron	10	Tan delta on outlet	yes/no	optional
Fine filter	micron	0.5	<b>Automatic control*</b>		
Coalescers	quantity	20	PLC logic	yes/no	optional
Advanced ring mesh	yes/no	optional	Digital touch screen	yes/no	optional
<b>El.power supply</b>			<b>Noise</b>		
El. Heater steps	quantity	02 - 06	Level	dB	<70
El. Heater steps	kW	108 - 200	*these items are optional		
Motors	kW	11			

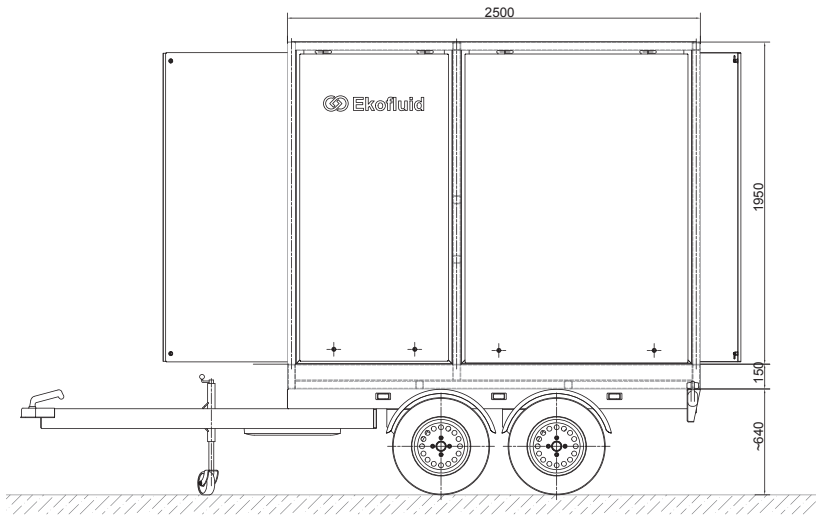
SIDE VIEW



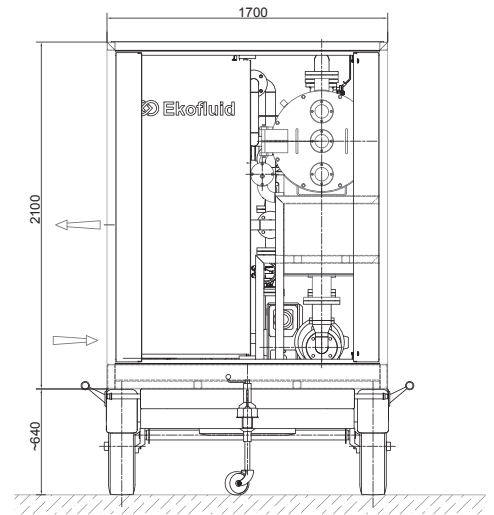
VIEW - A



SIDE VIEW



VIEW - B



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