

Oil Purification Plants



Oil Purification Plant



Process Description

Standard plants for the treatment of insulating oils, oil filling and drying electrical equipment, such as transformers and switchgears.

The oil to be treated is fed into the VOP plant by means of differential pressure. Through the electrical heater the oil is heated to the pre-selected temperature and directed into the degassing phase. An automatic level control guarantees, at pre-selected flow-through, an optimised degassing of the insulating oils.

By means of a frequency controlled feeding pump, the dewatered and degassed oil is transferred back into the transformer through the fine filter column.

Technical Characteristics

- Single stage, air-cooled vacuum system
- Variable flow-through according to type, from 100 lt/h to 20'000 lt/h
- Anti-Froth Control system in the degassing tank (AFC-System)
- Automatic overflow safety device
- Variable degassing values
- PID-regulated Thyristor heating system
- Variable fine filter inserts
- Automatic indication for filter changes
- PLC controlled system
- Modular build-up
- Short delivery times

Special Application

In order to control the increased froth behaviour of the treated insulating oil, an automatic froth surveillance system is installed into the new degassing tank. During the treatment phase a special automatic process prevents an overflowing of vacuum pumps with insulating oil.

All Oil Purification Plants are designed for online treatment on energized transformer. Additional safety equipments (Z?) are needed.

General Characteristics

Higher degassing and dewatering efficiency factor at a protective treating process. After treatment, the oil characteristics are vastly kept (light fractions, as well as chemical basis from the oil are not evacuated).

The VOP plant is modular build-up and can be technologically expanded, at any time, without additional modifications.

Substantial Plant Characteristics

Oil Heating

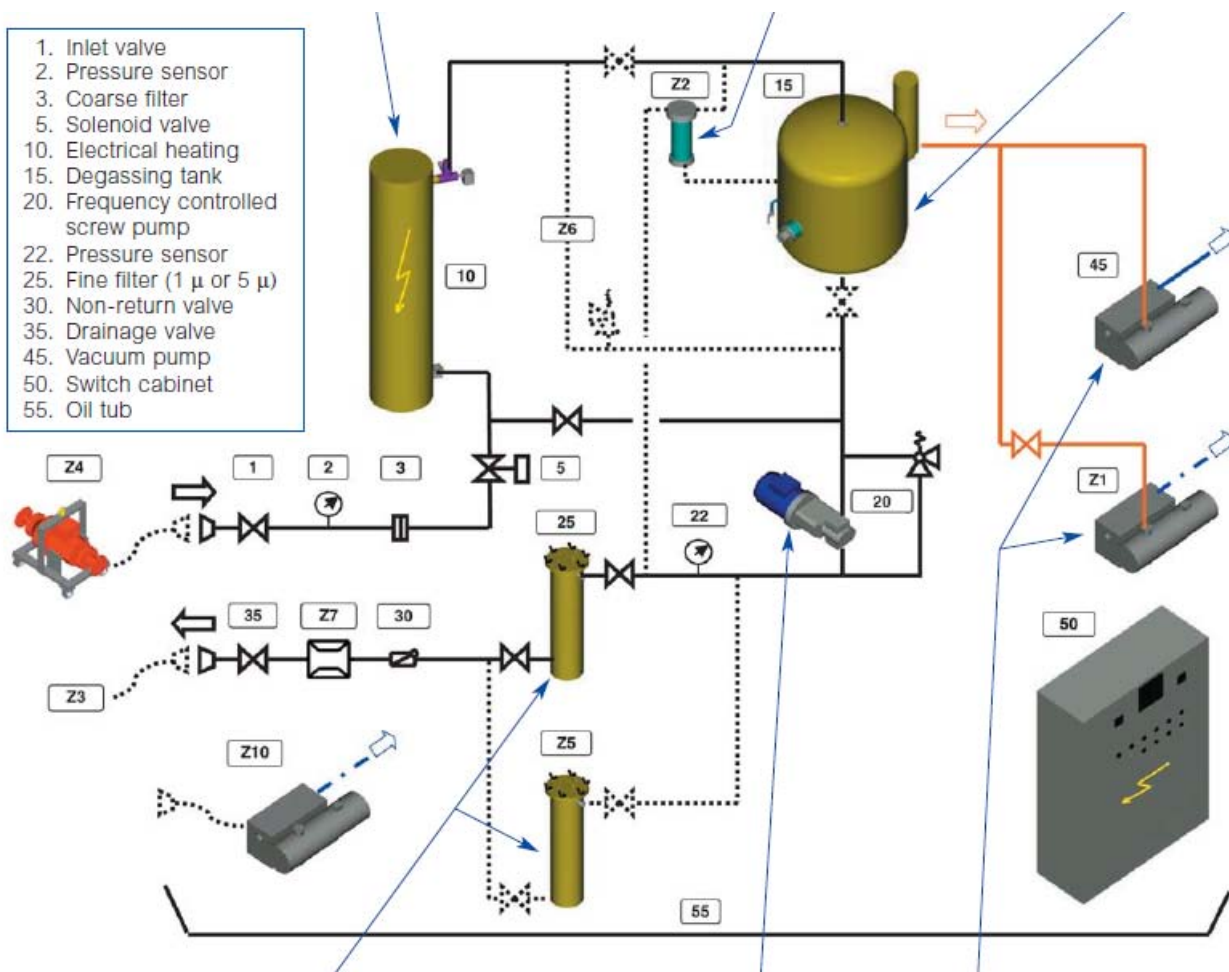
The oil to be treated is heated by means of an electrically heated, PID controlled oil heater, which is brought to the required treating temperature. The heating elements are placed into welded-in protection tubes, separated from the oil. The horizontal position and generously dimensioned heating surface allow a careful heating-up of the oil.

Online Oil Measuring

A new measuring instrument for the determination of the oil quality at the in/outlet of the plant guarantees an optimal treating duration. Data is continuously registered on a 6-channel recorder.

Degassing System

The degassing system has been optimised and expanded with an automatic froth control. New is also the automatic level control, dependent on the adjusted flow-through rate. Excellent degassing values and superior oil quality are guaranteed.



Filtration

- A built-in pre-filter at the inlet of the VOP plant protects the plant against coarse contamination
- Fine filter cartridges with automatic control of dirtiness
- The filter elements are made of special synthetic material and are non-hygroscopic

Oil Feeding

Conveying of oil in the degassing phase is carried out by means of differential pressure. A frequency controlled feeding pump allows for variable oil flow-throughs. A specially developed automatic screen guarantees an even oil flow-through in the degassing phase. A photo electronical level surveillance controls the maximum admissible oil level in the degassing tank.

Vacuum Plant

For the evacuation of gasses, developed in the degassing tank, only rotary slide vane vacuum pumps are now used. To achieve lower guarantee values only the suction capacity of the vacuum pump is increased.

Supplements

A large selection of supplements can be ordered together with the VOP plant. Supplements ordered at a later stage can be easily installed into the plant without refitting.



Z1
Optional vacuum pump (extended suction capacity)



Z3
Flexible hoses with coupling



Z4 Extern feeding pump



Z5
Additional fine filter



Z7 Flow-through meter



Z8
Safety level probe



Z15
Frame with tarpaulin



Z17
Roadworthy trailer with box

Special Plants

- Regeneration / Fuller plants
- Cable oil treatment plants
- Silicon oil treatment plants
- Generator oil treatment plants
- Oil spray plants
- Online oil treatment on energized transformer

Special Plants

- Z2 Water & gas content measuring device VZ 212 A
- Z6 By-pass system for heating and / or filtration
- Z9 Oil sampler connection piece
- Z10 Vacuum pump for transformer evacuation
- Z11 Signal device to mobile phone (GSM Modem)
- Z18 Roadworthy trailer with tarpaulin
- Z20 Spare parts for many years of plant operation

Type Outline and Selection Assistance

Plant type	Type description	Flow-through	Guaranteed end values in reference to flow-through ²			Oil content in transformer
			100 %	50 %	30 %	
		[lt/h]	[ppm/Vol%]			[t]
Standard Oil Purification Plants ¹	VOP 10	300 - 1000	<8 / <0.09	<5 / <0.06	<4 / <0.05	> 4
	VOP 30	1000 - 3000	<8 / <0.09	<5 / <0.06	<4 / <0.05	> 10
	VOP 60	2000 - 6000	<8 / <0.09	<5 / <0.06	<4 / <0.05	> 30
	VOP 90	3000 - 9000	<8 / <0.09	<5 / <0.06	<4 / <0.05	> 50
	VOP 120	4000 - 12000	<8 / <0.09	<5 / <0.06	<4 / <0.05	> 120
Oil Purification Plants with extended suction capacity for best treatment values ¹	VOP 10 (Z1)	300 - 1000	<4 / <0.05	<3 / <0.04	<2 / <0.03	> 4
	VOP 30 (Z1)	1000 - 3000	<4 / <0.05	<3 / <0.04	<2 / <0.03	> 10
	VOP 60 (Z1)	2000 - 6000	<4 / <0.05	<3 / <0.04	<2 / <0.03	> 30
	VOP 90 (Z1)	3000 - 9000	<4 / <0.05	<3 / <0.04	<2 / <0.03	> 50
	VOP 120 (Z1)	4000 - 12000	<4 / <0.05	<3 / <0.04	<2 / <0.03	> 120
Special plants	VOP 03	100 / 300	<4 / <0.05	<3 / <0.04	<2 / <0.03	> 2
	VOP 160	4000 / 16000	<8 / <0.09	<5 / <0.06	<4 / <0.05	> 150
	VOP 200	6000 / 20000	<8 / <0.09	<5 / <0.06	<4 / <0.05	> 200
Maintenance of transformers (oil spray)	VOP 60 RS	2000 - 6000	<4 / <0.05	<3 / <0.04	<2 / <0.03	> 30
	VOP 90 RS	3000 - 9000	<4 / <0.05	<3 / <0.04	<2 / <0.03	> 50
	VOP 120 RS	4000 - 12000	<4 / <0.05	<3 / <0.04	<2 / <0.03	> 120
Oil regeneration with inhibitor unit	CRP 312-750	750				
	CRP 312-1500	1500				
	CRP 312-4500	4500				

¹ Online treatment on energized transformers with Z?

² Values prior to treating: water content 50 ppm, air content 10 vol %, temperature 20°C

Remarks

These guarantee values are valid for the treatment of naphthenic based insulating oils with normal froth behaviour, under consideration of no additional air acceptance after oil treatment.

Approx. Value of oil content in the transformers: 1/2 lt insulating oil per 1 kVA

For unattended operation additional safety equipments needed.

Measuring Equipment

Mobile measuring equipment for a manifold of applications are used for estimating the insulation oil quality. The measuring equipment can be used for commonly known insulating oils. The simple and over years reliable and proven concept makes these installations maintenance and operational friendly.



Water and Gas Content Measuring Unit VZ 212 A

This measuring unit serves as a continuous automatic measuring of the water and gas content at the in/outlet of the oil plant. The measuring unit can only be used together with an oil plant. The evaluation of the gas blanket pressure in the measuring cell can be carried out manually by means of a break-even chart or automatically via a 6-channel digital recorder.

Measuring range: water content 0.5-7 ppm / gas content 0.01-0.09 Vol %



VZ 220 A Tan Delta

- Resistance measuring unit to determinate the tan δ value
- Online resistance measuring unit to determinate the tan δ value

Measuring range: water content 0.5—50 ppm / gas content 0.01—2 Vol %



New VZ (Micavac)

Exact measuring of the specific water drainage (g/h*t) during the transformer drying in production and in the field. This measuring unit is independent and easy to operate.

Further Measuring Units

- Water content measuring unit in accordance to Karl Fischer
- Break-down voltage measuring unit up to 75 kV
- Break-down voltage measuring unit up to 100 kV