



Product brochure

Electrostatic Oil Cleaner

Turbotect
Saint-Petersburg Ltd.

Turbotect Saint-Petersburg Ltd.,
Krasnogo Kursanta str., 11/1-2,
Saint-Petersburg, Russia, 197110
Tel.: +7-812-380-20-77
Fax: +7-812-380-31-46
www.turbotectspb.com
E-mail: info@turbotectspb.com

TURBOTECT® ТУРБОТЕКТ®



Turbotect Saint-Petersburg Ltd. was founded in 1998 in Saint-Petersburg as a fully integrated company with in-house analytical, design, engineering, manufacturing and service departments. Turbotect Saint-Petersburg provides solutions to enable its clients to meet the increasingly demanding environmental regulations and maintain the efficiency and productivity of their power plants as close as possible to the nominal values.

Turbotect Saint-Petersburg is focused on the development and manufacturing of washing systems for gas turbine axial compressors and gas coolers, washing detergents and antifreeze agents, electrostatic oil cleaners, oil-filling and oil-collecting units for compressors and power stations.

Relying on its flexible organizational structure, Turbotect Saint-Petersburg offers customized solutions for the needs and requirements of its customers. Installation and maintenance services are available upon request and regular field visits by its engineers ensure continuous improvement and development of the company's products based on the needs of its customers.

Turbotect Saint-Petersburg guarantees the supply of spare parts and consumables over the entire lifetime of its products.

Turbotect Saint-Petersburg's electrostatic oil cleaner ensures high efficiency of oil facilities in the fields of gas transportation and power generation.

In 2006 Turbotect Saint-Petersburg Ltd. has implemented a quality management system certified to ISO 9001:2008. Starting 2014 the quality management system complies to ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007.



Short description

The oil cleaner is designed for cleaning different non-conductive fluids such as industrial oils used in control, lubrication and sealing systems for turbine-generator sets, etc.

Components of the unit (Fig.1) are:

- Control panel (1)
- Piping with shut-off valves (8)
- Electric pump (5)
- Filter system including a pre-treatment module (6)
- Dehydration module (7)
- Electrostatic cleaning module (4)
- Electrostatic cleaning controls (2)

All equipment is mounted on a mobile skid (3). Level gauges, water content sensors and electrically actuated shut-off valves allow fully automated operation. The oil cleaner's technical characteristics are shown in Table 1 below.

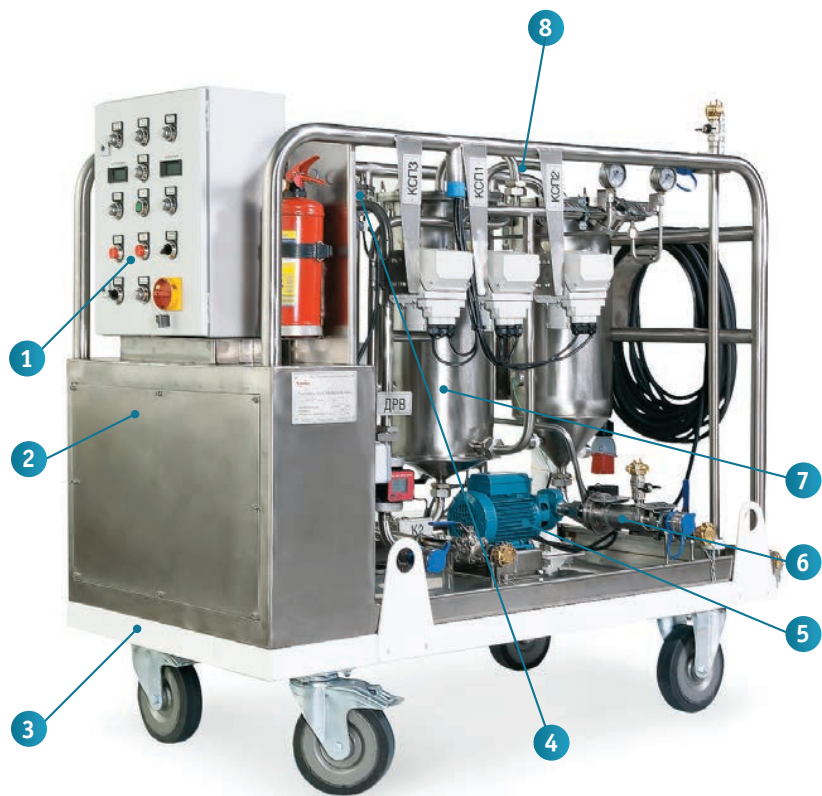


Fig. 1

Table 1

Parameter	Unit	Value
Length	mm	not more than 1600
Width	mm	not more than 800
Height	mm	not more than 1500
Weight	kg	not more than 350
Oil temperature	°C	10 - 70
Oil viscosity	cSt	1 - 100
Capacity	l/h	500
Admissible water content	%	not more than 0.001
Purity class according to: ISO 4406; GOST 17216; NAS 1638		-/11/9; 6; 3
Network type	-	3-ph. AC
Voltage	V	400
Frequency	Hz	50
Max power consumption	kW	1.5

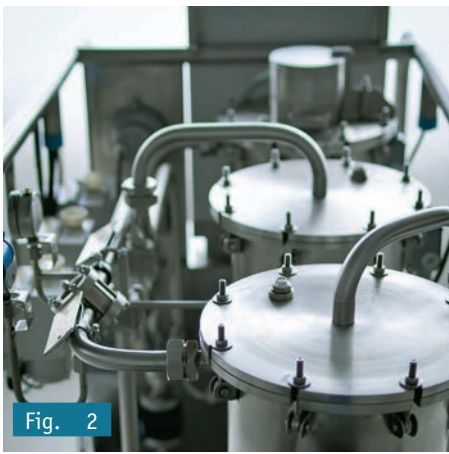


Fig. 2

All components in contact with the non-conductive fluid are made of materials resistant to aggressive substances. These materials include stainless steel, oil and petrol resistant rubber, etc. (Fig. 2).

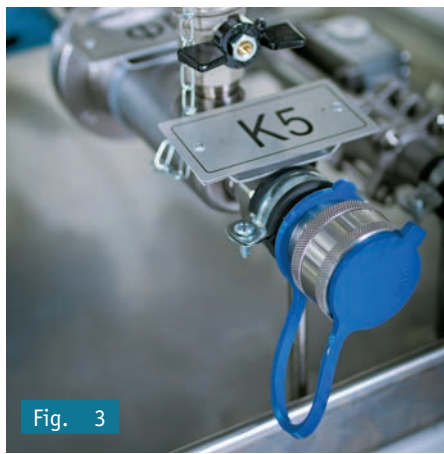


Fig. 3

All connections are designed as quick release couplings, thus preventing oil leakage when connecting or disconnecting hoses (Fig. 3).



Fig. 4

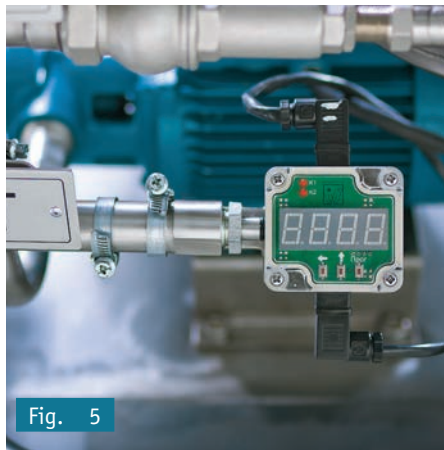


Fig. 5

Safety valves ensure fail-safe operation in an emergency. Sensors initiate an automatic shutdown if the covers of the cleaning modules are open during operation (Fig. 4, 5, 6).



Fig. 6

Contamination of oil

Oil contains different impurities such as carbon, corundum, iron oxide, calcium carbonate and carbide silicon or water (Fig. 7, 8). Such impurities decrease the quality of the oil and may cause major failures during operation. Water in oil increases its conductivity considerably.



Fig. 7

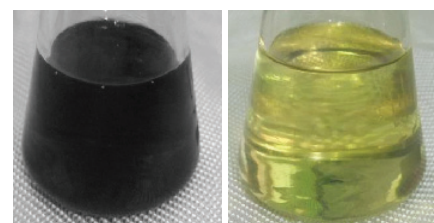


Fig. 8

Process description

The oil treatment is performed in three stages (Fig. 9):

- Coalescence pre-treatment (1)
- Dehydration by sorption (2)
- Electrostatic cleaning (3)

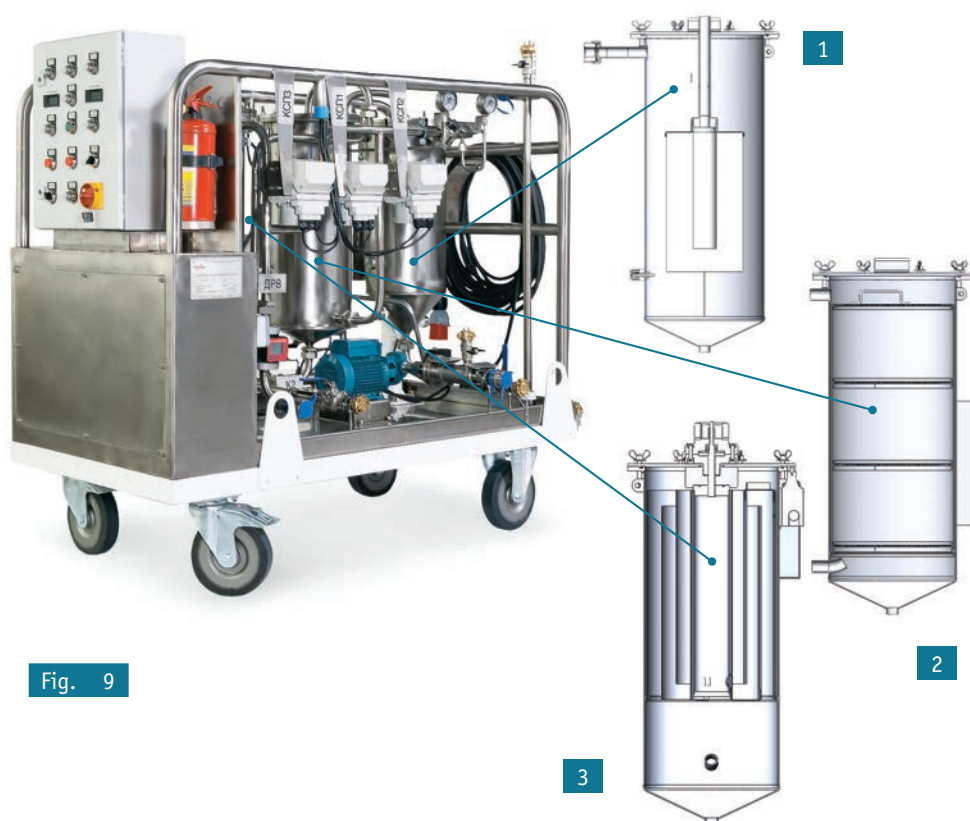


Fig. 9

The oil cleaner can operate in two different modes depending on the presence or absence of water in the oil to be cleaned (water content is detected automatically).

Fig. 10



Mode No.1 – Pre-treatment

The system monitors the oil permanently and detects water if it exceeds the solubility level. In the case of water detection, only the pre-treatment module starts operating. The separation of water and oil is achieved through the effect of coalescence during the removal of coarse (over 5 μm) mechanical impurities from the oil.

Water not dissolved in oil is automatically detected by water sensors. The water is separated in a special filter element (Fig. 10) and accumulates in a dedicated container, which is drained automatically from time to time. The filter element is designed for multi-cycle use and can be cleaned by washing and spinning.



Fig. 11

Mode No.2 – Fine cleaning

If no water is detected in the oil or its content is lower than the solubility limit (as monitored by the pre-treatment module), the second and third modules are activated automatically to perform a complete dehydration of the oil through a sorption filter and to remove micron and submicron mechanical impurities through electrostatic cleaning.

Zeolite (Fig. 11) is applied as filter medium for the dehydration of the oil. The filter can be dried after use and must be replaced from time to time.

Method of electrostatic cleaning of industrial oils

The most efficient method of removing submicron impurities from oil is electrostatic cleaning. The electrostatic cleaning is based on the processes of electrophoresis and dielectrophoresis. An electrostatic field is induced in the cross-section of the oil flow by conductive plates connected to different potentials. Polarized particles receive a positive or negative charge and start moving in the counter-flow direction towards the walls where they are absorbed (Fig. 12). Typically, the walls consist of fibrous paper. Particles reaching the walls are trapped in the fibers and removed from the flow.

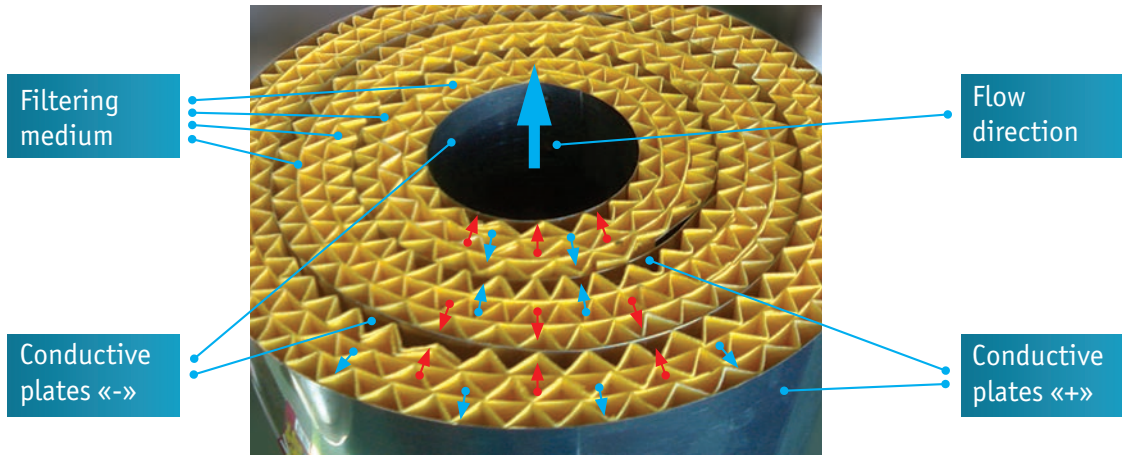


Fig. 12

An alarm on the control panel informs the operator when it is necessary to replace the filter medium.

Features

- Mobile and compact unit designed for easy lifting.
- Parts in contact with the non-conductive fluid made of corrosion resistant materials (stainless steel, oil and petrol-resistant rubber).
- Quick connection and disconnection of oil supply hoses while preventing any oil leakage during disconnection.
- Monitoring of main process parameters through dedicated instruments and alarms.
- Low energy consumption.
- Connection to an oil tank (or oil container) with a set of hoses and adapters included in the scope of supply.
- Standalone mode during gas-turbine operation permissible.
- Possibility to clean other non-conductive liquids.
- Deceleration of oil degradation.



Turbotect Saint-Petersburg Ltd.,

Headquarter:

**Krasnogo Kursanta str., 11/1-2,
Saint-Petersburg, Russia, 197110**

Tel.: +7-812-380-20-77

Fax: +7-812-380-31-46

www.turbotectspb.com

E-mail: info@turbotectspb.com