Product brochure

Electrostatic Oil Cleaner

Turbotect Saint-Petersburg Ltd.

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ISO 9001:2008
Certified Management System

TURBOTECT® ТУРБОТЕКТ®

Introduction

Turbotect Saint-Petersburg Ltd. was founded in 1998 in St. Petersburg, Russia as a fully integrated company with in-house engineering and manufacturing facilities. Turbotect St. Petersburg offers solutions to enable its clients to meet the increasingly demanding environmental regulations and keep the efficiency and productivity of their power plants as close as possible to the nominal values. Relying on its flexible organizational structure Turbotect Saint-Petersburg Ltd. offers customized turnkey solutions for the requirements of its clients.

Turbotect Saint-Petersburg has implemented a quality management system certified to ISO 9001-2008.

For the purpose of maintenance of oil facilities in the gas transportation and energy industries, Turbotect Saint-Petersburg Ltd. offers electrostatic oil cleaner.


Certificate

ISO 9001:2008

Turbotect Saint-Petersburg Ltd.

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Short description

The oil cleaner is designed for cleaning 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). For automatic operation, the unit is equipped with level gauges, water content sensors and electrically actuated shut-off valves. Its technical characteristics are shown in Table 1.

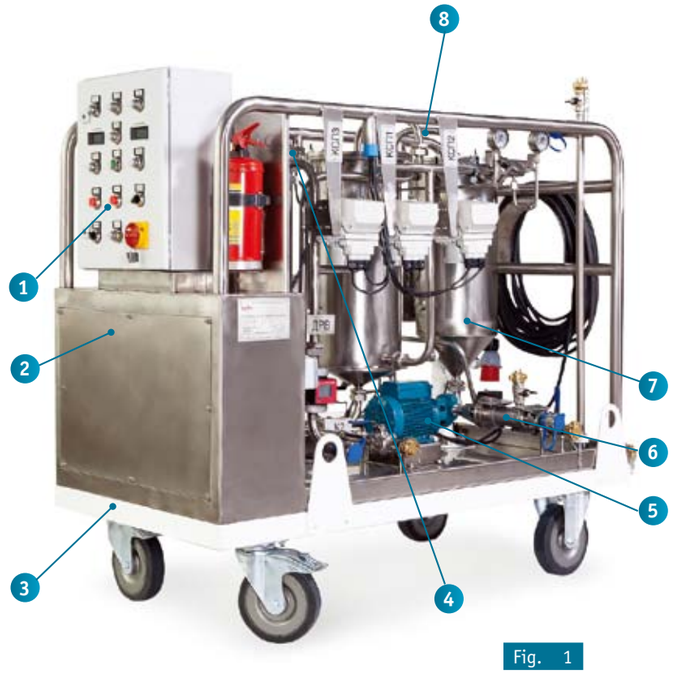


Fig. 1

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 viskosity	cSt	1 - 100
Capasity	l/h	500
Water content	%	not more than 0,001
Purity class according to: GOST 17216; ISO4406; NAS 1638		6; -/11/9; 3
Network type	-	3-ph. AC
Required voltage	V	380
Network frequency	Hz	50
Max power consumption	kW	1.5

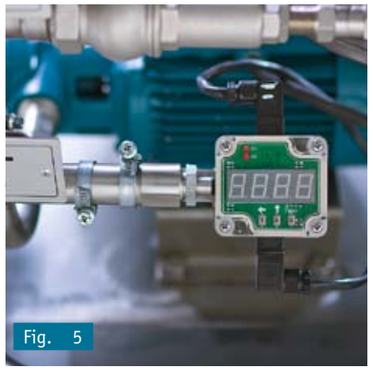


Fig. 5


Fig. 4

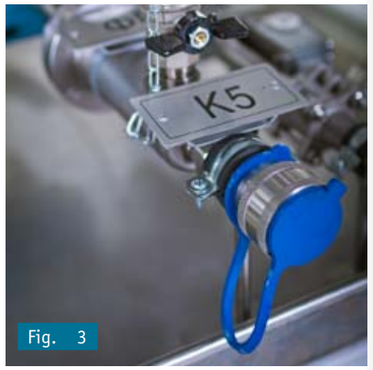


Fig. 3


Fig. 2


Fig. 9


Fig. 6

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

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

The unit is equipped with safety valves ensuring fail-safe operation in case of an emergency and sensors for an automatic shutdown when the covers of the cleaning modules are open (Fig. 4, 5, 6).

Chemical and process description

Oil contains different impurities such as carbon, corundum, iron oxide, calcium carbonate and carbide silicon or water. The impurities are decreasing the quality of oil and can occur major failures during operation. The presence of water in oil means heavy increase of conductivity.


Fig. 7

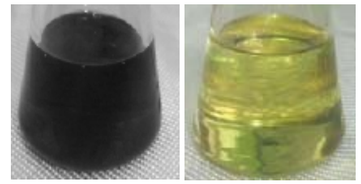


Fig. 8

Operation description

- Oil cleaning is performed in three stages (Fig. 9):
- Coalescence pre-treatment
- Dehydration by sorption
- Electrostatic cleaning.

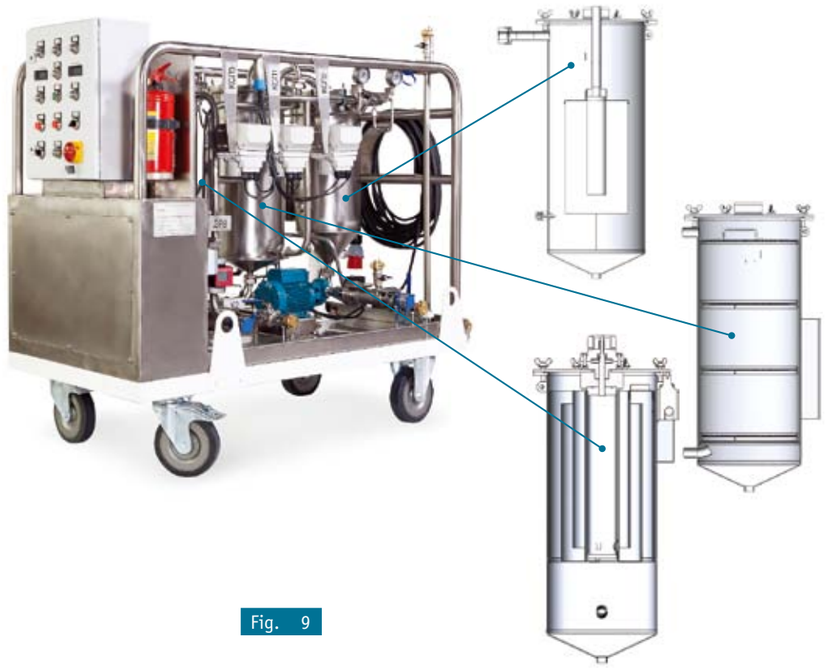


Fig. 9

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 detects the content of water in the oil if it exceeds the solubility limit, i.e. 0.03 %. In this case only the pre-treatment module is in operation. The separation of water and oil is achieved through the effect of coalescence while removing coarse (over 5 µm) mechanical impurities from the oil.

The working principle is based on the separation of water, which is not dissolved in oil, in a special filter element (Fig. 10) and accumulation of the separated water in a special container followed by its automatic draining. This cleaning module is equipped with water content sensors for an automatic operation. The filter medium is designed for a multi-cycle purification. The purification of filter medium is done by washing and spinning.

Fig. 11

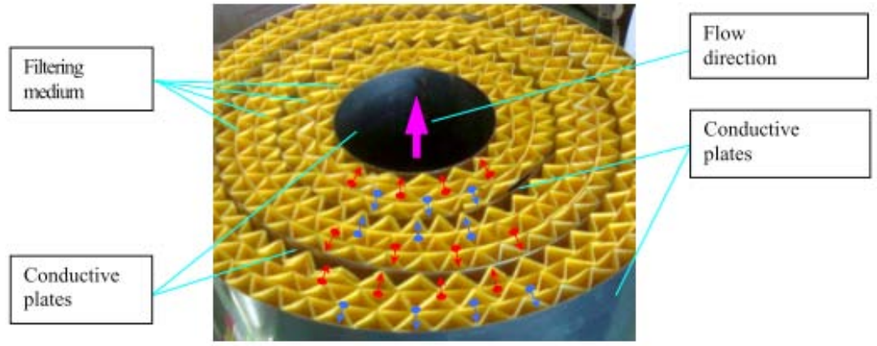
Mode No.2 – Fine cleaning

If no water is present in the oil or its content is lower than 0.03 % (as detected by the pretreatment module), the second and third modules are activated automatically for a complete dehydration of the oil by a sorption filter and the removal of submicron mechanical impurities by electrostatic cleaning.

The filter medium of the module responsible for oil dehydration is zeolite (Fig. 11). The purification of filter medium is done by zeolite replacement or drying.

Method of electrostatic cleaning of industrial oils

The most efficient method of removing submicron impurities is electrostatic cleaning. This method is based on electrophoresis and dielectrophoresis. An electrostatic field is induced in the cross section of the oil flow through of 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. 10). Normally, the walls are made of fibrous paper and, having reached a wall; particles are entrapped in the fibers and removed from the flow.



An alarm on the control panel informs the operator of the necessity to replace or purify the filter medium.

Features

The oil cleaner meets the following requirements:

- The mobile and compact unit is equipped with lifting lugs.
- Parts in contact with non-conductive fluid are made of corrosion resistant materials (stainless steel, oil and petrol resistant rubber).
- Connecting branches allow quick connection and disconnection of oil supply hoses while preventing any oil leakage during disconnection.
- The unit is equipped with instruments and alarms for all main process parameters.
- Low energy consumption.
- The unit is connected to an oil tank (or oil container) with a set of hoses and adapters included in the delivery and can operate in a standalone mode during the gas-turbine operation.
- Options to clean other non-conductive liquids
- Deceleration of oil degradation

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