

ReGenX™

Transformer Insulating Oil Purification & Regeneration Plant



Purification

Purification of transformer insulating oil is a well-recognized preventive maintenance practice performed regularly; typically every few months; to ensure the reliable performance of electrical apparatus such as power transformers, tap changers, circuit breakers, and bushings. Over time, insulating oils absorb moisture, gases, and solid contaminants, which can significantly impair their dual role as a dielectric insulator and cooling medium. If left untreated, these impurities may lead to electrical failures, reduced insulation resistance, and overheating. The purification process includes controlled heating, filtration, and vacuum degassing to remove dissolved gases and moisture. The oil is circulated through fine filters to eliminate solid particles and sludge, followed by vacuum treatment under high vacuum conditions. A coalescing filter is typically integrated to enhance water removal efficiency. This process restores the oil's dielectric strength, reduces oxidation risks, and extends the life of both the insulating fluid and the transformer.



ReGenX-2000, Mobile in 20-foot Container, 6 Columns - 2000 l/h



Purification

- * Water Removal
- * Combustible Gas and Air Removal
- * Particulate Matter and dirt Removal
- * Tan Delta Improvement
- * Dielectric Strength increment

3 to 24 Columns
500 l/h to 10000 l/h

Regeneration of aged Transformer Oil to new condition according to IEC 60422 & IEC 60269

Regeneration

- * The increment of Interfacial Tension & Oxidation stability
- * The reduction of Power Factor and gassing tendency
- * The removal and reduction of **Acidity**, Silicon content, Sulfur Odor & Color

The ReGenX Plant can be delivered in two configurations: for **Regeneration** only, or for **Combined Purification and Regeneration** of transformer insulating oils. Depending on customer requirements, the system is available as a **Stationary Installation** or a **Mobile unit**. Mobile versions are custom-engineered and delivered in roadworthy trailers, semi-trailers, containers, or industrial cabins, allowing flexible operation on-site or across multiple transformer locations. Processing can be carried out **off-load** or **on-load** (energized transformers), or from storage tanks, drums, or IBC containers, depending on the operational setup. In the combined version, the oil is first preheated and prefiltered, then passed through regeneration columns filled with **TURBOSORB** adsorbent for the removal of aging by-products, acidity, and sludge. This is followed by further heating, fine filtration, and final degassing and moisture removal in a high-vacuum chamber operating at pressures below 1 mbar absolute, equipped with a coalescing filter to ensure optimal dryness and gas-free oil before returning it to service. An oil desludging mode is also available, operating at elevated temperatures around 85 °C, to effectively separate suspended and settled contaminants. Through the integrated control panel, the operator can easily select from different operating modes: purification only, regeneration only, combined purification and regeneration, or desludging; offering full process flexibility to match specific site or oil conditions.

"ReGenX keeps transformers efficient, reliable, and protected – while minimizing downtime and costs."

Two Stages Vacuum
Pumps, (Vacuum pump
& Boster)
less than 1 mbar a,
for Oil Degassing Process

Using Mineral Adsorbent
for Oil Regeneration

300-500 times
Adsorbent Reactivation
Befor replacement

Enviromentally Friendly
Electrical Power Systems

TEST DESCRIPTION	METHOD	UNIT	INITIAL OIL CONDITION	SINGLE PASS QUALITY
MOISTURE	1EC 733	PPM	< 100	5
BREAKDOWN VOLTAGE	IEC 156	Kv/2.5 mm	< 20	> 70 (up to 100)
ACIDITY	IEC 296	mg KOH/g	<0.20	<0.03 (up to 0.01)
Power Factor @ 100°C	ASTM D-924-15	%	> 1	< 0.4
TAN DELTA (90 degrees C)	IEC 247		<0.01	<0.005
INTERFACIAL TENSION	ASTM D-971-20	Dynes/cm	<15	>35 (up to 50)
COLOUR APPEARANCE		VISUAL	BROWN/CLOUDY	CLEAR LIGHT YELLOW
GAS CONTENT	ASTM D-2945	%v/v	8	> 0.01
OXIDATION	IEC 74 164 HOURS		DEPLETED	RESTORED

Analyze of Transformer Oil before and after treatment

Technical information

Enviroflex manufactures a wide range of Purification & Regeneration Plants (ReGeneX) of various models & codes. The following data is a general indication only:

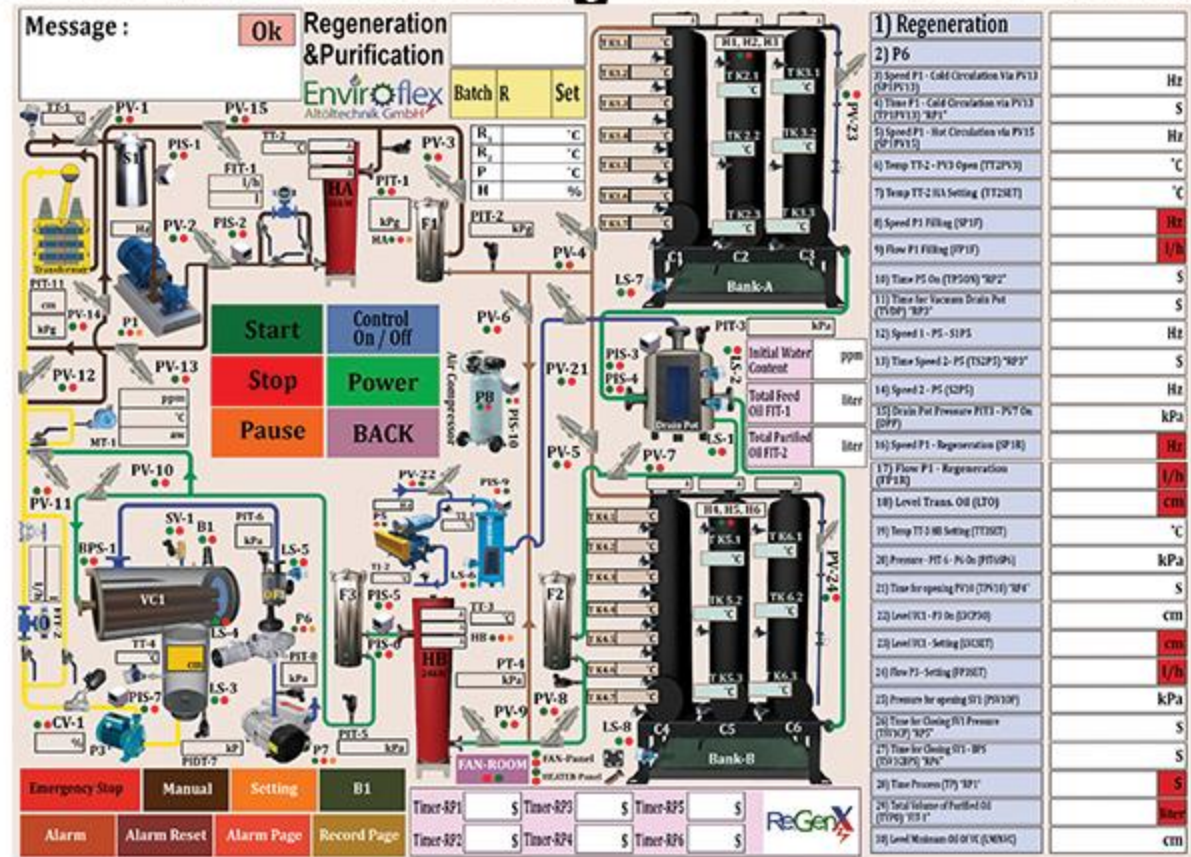
Models:	ReGenX-1000 (3 Columns) , ReGenX-2000 (6 Columns) ReGenX-4000 (12 Columns), ReGenX-8000 (24 Columns)
Code:	ENF-TO PRDMP-f-nCF-mCd Code Description: P: Purification, R: Regeneration, D: Desludging M: Mobile (S: Stationary), f: flow rate in Liter per Hour n: Quantity of coalesce filters, m: Quantity of columns d: Diameter of columns in inch
Flow Rate:	500 l/h to 8000 l/h in different models & codes
Quantity of Columns:	3 - 6 - 12 - 24 in different models
Mobile Transport:	Trailer, Double Axel Semi-trailer
Inlet pump:	Gear type
Inlet strainer:	Gross particle removal 60 - 90 micron
Inlet filter:	Porosity 10 or 5 µm
Oil heating:	Indirect Electrical Heater, Low Watt Density
Vacuum chamber:	Our design with Coalesce Filters
Vacuum pumps:	Direct drive, high efficiency Rotary Vane or Dry Screw vacuum pumps
Vacuum booster:	Direct drive, Roots type
Adsorbent Treatment:	Mild steel columns filled with structured Adsorbent (TURBOSORB)
Adsorbent Reactivation:	Thermal, Electrical, up to 500 time before replacement
Polishing filter:	Porosity 0.5-1.0 µm
Discharge Pump:	High suction, Centrifugal
Drain pump:	Eccentric Screw Pump
Odor Emission Unit:	Reduces emissions from the system consists of Chemical Scrubber & Activated Charcoal Filter
Electrical Supply:	As required
Main Application:	Transformer Oil Purification, Regeneration & Desludging
Other Applications:	Base Oil Upgrading, Hydraulic Oil Regeneration, Diesel Treatment, Paraffin Decolorization



Regeneration Module (Bank)
with 3 Columns



Vacuum Chamber
consists of Coalescer Filters, Vacuum Pump
& Booster for Removing Gas & Water from Oil



Plant Control Page, Automation, HMI, SCADA

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