



YOUR PARTNER IN VACUUM
TECHNOLOGY



EOK-TORS® Series

Transformer Oil Regeneration System

Hering - VPT GmbH
www.hering-vpt.de

HERING – Vacuum Process Technology

Invaluable experience and customized solutions powered by German Engineering

HERING VPT has specialized in improving the life cycle of transformers. Already in 1909 the first HERING oil purification plant was built and gave the possibility to carry out an internal and external insulating oil treatment by the use of a vapour-oil boiler. This was the starting point for a number of inventions like Transformer Drying ovens, Impregnating Plants and other vacuum products for the transformer industry. With this **experience collected in over 100 years of successful operation**, continuous efficiency improvements of our plants are carried out.

Hering Systems are remarkable for their efficient and robust design, as well as their ease of operation and maintenance. We install **only high quality components from Germany**, respected West European brand manufacturers. Our systems are designed for **long lifetime, reliability** and effective operation. Each plant is **custom-made** and delivered with all required aggregates to leave nothing to be desired.

Together, we will develop the perfect solution for you and your company. We are looking forward to serving you!



Hering - VPT GmbH
www.hering-vpt.de



HERING – Vacuum Process Technology

Transformer oil regeneration is needed to remove by-products & contaminants

Regeneration systems typically **remove the by-products of aging** from used transformer oil.

Transformer oil mainly consists of a mixture of hydrocarbons which **deteriorate over time**. Deterioration is mainly due to contamination, overheating, electrical stress, and oxidation. This causes by-products to form in the oil which increase acidity (neutralization number) and decrease the interfacial tension of the oil. The sludge that forms during this process and the other by-products lead to a loss in dielectric properties. At this point, the **transformer oil must be replaced or fully regenerated** to ensure the efficient and safe operation of the transformer.

There are traditionally two approaches to the removal of these contaminants, either approach will **result in the used oil being restored to 'as new' state**: Reactivation or single-use fullers earth application.

Our **EOK-TORS®** Series powered by Redragon **reactivation type** oil regeneration systems combine **higher efficiency, longer lifetime** and **increased flexibility** when compared to single-use fullers earth:

Comparison of Reactivation vs. Single-use Fullers Earth systems used under identical conditions

	Reactivation	Single-use
Method	Process, saturate, reactivate, process, saturate, reactivate, etc	Process, saturate, dispose
Disposal	Regular landfill	Specialist
Times used	300 - 500	1
Oil loss	< 0.4%	> 5%
Amount required to process 2.5 Mlitre	1 ton	100 ton
Lifetime yield	2500 litre/kg	25 litre/kg
Change-out frequency	4 years	1 week



Transformer oil in various stages of the oil regeneration process

HERING – Vacuum Process Technology

EOK-TORS® Series significantly outperforms industry standards and returns oil ‘as new’

In the **EOK-TORS® Series** equipment, the transformer oil is regenerated through a multi-step process which provides your transformers with ‘as new’ transformer oil. The regenerated transformer oil **outperforms** the requirements set by the industry **standard for insulating oils**.

Characteristic	Unit	IEC 60422 Standard	EOK-TORS® regeneration
Acidity	mg KOH/g Oil	<=0.03	<0.01
Color	L	<=2.0	<0.5
Corrosive Sulphur		Absent	Absent
Dielectric breakdown voltage	kV	>60	>70
Moisture content	ppm	<10	<5
Tan delta @ 90°C		<=0.01	<0.001
Gas content	%		<0.1
IFT	dynes/cm		>40
Oxidation - acidity	mg KOH/g Oil		<0.2
Sludge	%		<0.03
Particle size	μ		<2
Appearance			Sparkling

First, the oil is filtered to ensure the longevity of the regeneration system. Through a heating unit, the temperature of the transformer oil is increased to the **ideal working point for regeneration**. Then, the oil is pumped through the sorbent material to **filter out any impurities and deterioration by-products**. After this advanced filtering, the transformer oil enters the **degassing** stage where the oil is **dehydrated** and cleared of its gas content. Afterwards, the regenerated oil can be directly pumped back into the transformer.

To keep the sorbent material at a high level of effectiveness, the EOK-TORS® system applies a **reactivation process**. Hereby, the EOK-TORS®’ vacuum technology is used to remove the impurities from the sorbent and return it to its initial state. The reactivation ensures a **maximum lifetime for the sorbent material** and **high efficiency levels** for the EOK-TORS®.

HERING – Vacuum Process Technology

Economic and operational benefits make EOK-TORS® Series the perfect choice

Regenerating your transformer oil with the EOK-TORS® Series provides you with:

- **Economic advantages** – regenerated oil is 20 to 50% cheaper than buying new
- **Life extension with efficiency boost** – transformer oil can be regenerated more than six times without efficiency loss
- **Control of transformer oil as strategic asset** – use of EOK-TORS® makes you independent from oil suppliers
- **Removal of corrosive sulfur** – Dibenzyl Disulfide, one of the main causes for transformer failures, gets removed expanding your equipment's lifespan
- **No downtime due to regenerating** – EOK-TORS® units can be operated on energized transformers as effectively as on un-energized transformers



Large Scale Unattended Tank Farm Operation



Skid Mounted EOK-TORS



EOK-TORS 6000 at underground generating station



Compact Mobile Trailer Mounted EOK-TORS

HERING – Vacuum Process Technology

EOK-TORS® Series modular design ensures flexibility and customizability

The EOK-TORS® Series allows for customization of the reactivation type of regeneration system. Larger systems are ideally suited to **unattended tank farm operation** with **flexible number of columns** used and hence volume processed. **Mobile systems** enables off-site operation, but sizes are limited by the prevailing road regulations in the delivery country.

Available system add-ons:

- DBPC blend-back modules
- Equipped onboard laboratory
- Remote control and monitoring
- Personnel amenities
- Selection of inline instrumentation
- Custom SCADA and HMI interfaces
- Mobile options including various trailers, sea container versions and castors.

Model	Flow rate US GPH nominal	Oil heater kW	Vacuum pump m ³ h ⁻¹ (CFM)	Roots booster m ³ h ⁻¹ (CFM)	Chamber inches, ∅	Oil pumps kW (HP)	Supply required Amps at 380V (480V)
TORS-100	25	3	6 (4)	N/A	14	4 (3)	25A (20A)
TORS-500	125	9	25 (20)	N/A	14	4 (3)	40A (32A)
TORS-1000	250	16	63 (41)	280 (200)	20	5 (6)	60A (50A)
TORS-1500	400	32	165 (117)	560 (400)	20	5 (6)	90A (80A)
TORS-2000	500	32	200 (141)	765(540)	20	5 (6)	120A (100A)
TORS-3000	800	48	255 (180)	1000 (705)	20	5 (6)	160A (130A)
TORS-4000	1000	64	300 (212)	2000 (1410)	20	7(9)	200A (160A)
TORS-5000	1250	80	400 (330)	2000 (1410)	25	7(9)	250A (200A)
TORS-6000	1500	96	500 (413)	2600 (1835)	25	7 (9)	300A (250A)
TORS-10000	2500	160	1000 (704)	3825 (2700)	30	11 (15)	400A (320A)

Model	No. of columns	Inlet size mm (in)	Outlet size mm (in)	Vacuum line mm (in)	Length mm (in)	Width mm (in)	Height mm (in)	Weight kg (lb)
TORS-100	2 x 1	12 (1/2)	12 (1/2)	12 (1/2)	3650 (144)	1800 (72)	2450 (96)	3000 (6600)
TORS-500	2 x 2	19 (3/4)	19 (3/4)	25 (1)	4500 (180)	2100 (84)	2450 (96)	4800 (10500)
TORS-1000	2 x 3	25 (1)	25 (1)	40 (1-1/2)	4500 (180)	2450 (96)	2450 (96)	6400 (14000)
TORS-1500	2 x 5	25 (1)	25 (1)	50 (2)	6000 (240)	2450 (96)	2450 (96)	7500 (16500)
TORS-2000	2 x 6	40 (1-1/2)	40 (1-1/2)	50 (2)	6000 (240)	2450 (96)	2450 (96)	8600 (18900)
TORS-3000	2 x 9	40 (1-1/2)	40 (1-1/2)	50 (2)	7600 (300)	2450 (96)	2450 (96)	9500 (20900)
TORS-4000	2 x 12	40 (1-1/2)	40 (1-1/2)	50 (2)	9100 (360)	2450 (96)	2450 (96)	10400 (22800)
TORS-5000	2 x 15	40 (1-1/2)	40 (1-1/2)	75 (3)	9100 (360)	2450 (96)	2450 (96)	11600 (25500)
TORS-6000	2 x 18	40 (1-1/2)	40 (1-1/2)	75 (3)	9100 (360)	2450 (96)	2450 (96)	12700 (28000)
TORS-10000	2 x 30	50 (2)	50 (2)	150 (6)	12200 (480)	2450 (96)	2450 (96)	17000 (37400)

HERING – Vacuum Process Technology

Provides complementary training services for your benefit

HERING VPT offers its costumers in the context of the order fulfillment a **free training** for a safe operation of your plant in our company's facility. Furthermore, on costumer's demand an **on-site training** can be offered.

To ensure a proper operation of your system HERING VPT recommends an **on-site service**. This will be coordinated directly by HERING VPT and partly carried out with qualified partners.

Plants older than 30 years fall naturally under the plant service.



We are available for you **24 hours** a day, **7 days a week** in order to help you with your plant problems.

HERING – Vacuum Process Technology

The standard in transformer oil purification and insulation treatment solutions



Vacuum Oil Purifying Plant

Transformer Oil Regeneration Systems

Vacuum Drying Plant

Bushing Dryer

Vacuum Pumping Station

Oil Storing and Filling Plant

Vacuum Pressure Impregnation Plant

Hot Oil Spraying System



ADDRESS

Hering-VPT
D-91550 Dinkelsbühl
Ernst-Schenk-Str.10
Germany
Telephone: +49 9831 8834666

Hering-VPT
D-91710 Gunzenhausen
Richard-Stücklen-Strasse 19
Germany

Canada

Hering-VPT,
Suite 391, 6-425 Hespeler Road
Cambridge N1R 8J6
Canada
Telephone: +1 226 221 0061

EMAIL

info@hering-vpt.de