



Specification Sheet

Trojan ORS 4





## **KEY FEATURES**

<b>No. of Columns:</b>	<b>4 (double sized columns)</b>
<b>Total Media Volume:</b>	<b>1100kgs</b>
<b>Flow rate:</b>	<b>1000 LPH</b>
<b>Oil Heating:</b>	<b>18 kW</b>
<b>Vacuum Pump:</b>	<b>30 M3 Hr.</b>
<b>Water Removal:</b>	<b>to <math>\leq</math> 10 ppm</b>
<b>Gas Removal:</b>	<b>0.25%</b>
<b>Particulate Removal:</b>	<b>Inlet Strainer: Y Strainer Outlet: 1 micron</b>
<b>Water in Oil Sensor:</b>	<b>x 2: One each on Oil Inlet &amp; Outlet Oil Lines</b>
<b>Data Logger:</b>	<b>Data storage, download software</b>
<b>Power Requirements:</b>	<b>415V, 3 phase</b>
<b>During Oil Regeneration:</b>	<b>30 Amps</b>
<b>During Media Reactivation:</b>	<b>50 Amps</b>
<b>Mounting Configuration:</b>	<b>Double axle trailer, with air brakes, spare wheel, standing platforms Stainless steel canopy</b>
<b>Other Features / Inclusions:</b>	<b>Automatic foam level control Remote Communications Modem PLC Control Highly Automated Analysis Treatment Cycle Double skinned oil hoses with isolation valves Self-contained sump with leak detection</b>



## OPERATING CYCLES

The Trojan ORS has three separate treatment cycles;

1. **Analysis Cycle:** Oil is drawn from the transformer and directed past the sensor then returned to the transformer through the final particle filters. Water in oil relative humidity (relative saturation %), water in oil PPM and oil temperature are recorded at 30 minute intervals. This Analysis data allows accurate water in cellulose diagnosis prior to water removal, and allows a real understanding of dielectric risk.
2. **Transformer degasification / moisture reduction:** The ORS incorporates a compact, highly efficient vacuum processing system to dry and degas the oil. This process is essential when using the ORS on energized transformers to remove all water and dissolved gasses before the oil re-enters the transformer. The vacuum purification system can also be used independently, if required, bypassing the reclamation component (fullers earth columns).

### *Key Points:*

- Flow rate is in line with the oil reclamation system
- Includes automatic foam detection, with no operator involvement required
- Standard oil heating will provide a 25° C / 77° rise in oil temperature in a single pass.

NB: Vacuum is applied only to the oil in the Trojan's vacuum chamber, not on the transformer main tank.

3. **Regeneration** of aged transformer oil via an adsorption process. Several distinct and separate capabilities are possible during the oil regeneration process, which include:

### **Oil Regeneration**

Oil Regeneration can be conducted on energised or non-energised transformers, as well as bulk storage lots. Best results are achieved by re-circulating the oil through several passes of the ORS.

### *Considerations:*

- Flow Rate may vary depending if the transformer is energised or de-energised.
- The number of passes required will depend on the initial starting parameters and by taking regular samples throughout the process.
- Additional oil heating may be required in colder climates

### **Corrosive Sulphur Removal**

Corrosive sulphur can be removed from the oil via the Trojan ORS. The process for the effective removal of Corrosive Sulphur differs to that of Oil Regeneration and Desludging, and should therefore be treated as a separate issue entirely.

In short, to remove corrosive sulphur from the oil, multiple passes should be made through freshly reactivated media.

### *Key Factors:*

- Multiple passes will be required
- The columns should be filled with new, clean oil prior to connection to the transformer



- The media will likely need to be reactivated several times throughout the treatment process
- The regeneration process must be followed through to its endpoint as CS is one of the final contaminants to be removed. This may require a longer period on the transformer.

### **Vacuum Purification**

The ORS incorporates a compact, highly efficient vacuum processing system to dry and degas the oil. This process is essential when using the ORS on energized transformers to remove all water and dissolved gasses before the oil re-enters the transformer.

The vacuum purification system can also be used independently, if required, bypassing the reclamation component (fullers earth columns).

#### *Key Points:*

- Flow rate is in line with the oil reclamation system
- Includes automatic foam detection, with no operator involvement required
- Standard oil heating will provide a 25° C / 77° rise in oil temperature in a single pass. Additional heating can be included.

### **Process Description**

Appropriate connections are made between the transformer and the Trojan ORS via suitable oil hoses.

If the ORS is connected to an energised transformer, the ORS columns will have been filled with oil prior to connection so as to maintain the correct oil level in the transformer. The ORS will then be commissioned to the transformer via a safe, well proven, and highly automated process to fill the vacuum processor component and remove any air and bubbles.

The Regeneration Cycle comprises two distinct processes:

#### **Regeneration Cycle**

The oxidized aged oil is drawn from the bottom of the transformer, heated (if required) and circulated through the columns (tanks) of adsorbent "Fullers Earth" type media at a controlled flow rate to remove oxidation by products (acidity, sludge) and other contaminants.

Before being sent back to the top of the transformer, the oil passes through the vacuum processor to remove gases and moisture.

The oil also passes through various levels of particulate removal.

#### **Reactivation Cycle**

When the adsorbent media is saturated with contaminants, which will depend on the starting oil condition, the media in the columns is re-activated by an automated process. The reactivation process can take up to 24 hours, during which time all contaminants are removed from the media and it is returned to a like new condition. The Fullers Earth can typically be reactivated 200 to 300 times.



During reactivation, it is possible to operate the vacuum purification component, which will continue to circulate oil and remove moisture, gases and particles from the transformer oil & cellulose.

All contamination stored in the filter media is isolated into a separate tank for later disposal. Wastage is usually about 0.1% to 0.3% of the total oil volume being processed.

Once the correct internal parameters are met at the conclusion of the Reactivation Cycle, the system can be resume the Regeneration process.