



# Transformer Troubleshooting Guide



## DISSOLVED GAS ANALYSIS (DGA)

Over time, a transformer's insulating materials and electrical equipment begin to degrade, dissolving gases into the unit's oil. The rate and distribution of these generated gases ultimately leads to transformer failure.

We've listed the six most common DGA results, and the corresponding solutions that will *extend the life of your equipment*.



### 1.) High carbon monoxide content observed in the DGA



**Probable cause:** Inefficient cooling, overloading



**Solution:** Inspect the cooling system, replace the pump and/or valves

### 2.) High oxygen content observed in the DGA



**Probable cause:** Worn gaskets



**Solution:** Inspect for potential arcing or corona, replace the gaskets

### 3.) High ethylene, methane, and/or ethane content observed in the DGA



**Probable cause:** Overheated or worn load tap changer (LTC) contact



**Solution:** Check the LTC operation, inspect and replace the LTC contact

### 4.) Low levels of acetylene observed in the DGA



**Probable cause:** Short in the oil pump motor



**Solution:** Inspect and replace the LTC contact and motor; check for arcing, overloading

### 5.) High moisture content observed in the DGA



**Probable cause:** Worn or faulty gaskets, leaking air cell, spent desiccant, overloading



**Solution:** Inspect gaskets, air cells and silica gel; replace necessary parts

### 6.) Acetylene detected in the LTC oil DGA



**Probable cause:** Vacuum bottle failure, arcing



**Solution:** Inspect and replace the faulty vacuum bottles

## TRANSFORMER OIL

Transformer oil is used for its chemical properties and dielectric strength, acting as an insulator/cooling agent. It should be tested periodically to prevent costly downtime.

We've listed eight common problems with oil test results, levels and accumulation, and corresponding parts to extend the life of your transformers.



### 1.) Oil contamination from the main tank into the LTC (migration)

 **Probable cause:** Faulty seal between the LTC compartment and the main tank

 **Solution:** Inspect and replace the tap board and gaskets

### 2.) Oil temperature alarm, no oil flow alarm, and/or tripping fan motor

 **Probable cause:** Faulty temperature switch, failed oil pump and/or motor, failed fans

 **Solution:** Inspect and replace the temperature gauge, pump, pump motor and fans

### 3.) Oil accumulation in/around the control cabinet



**Probable cause:** Gasket leaks



**Solution:** Inspect and replace gaskets

### 4.) Bushing oil level is low



**Probable cause:** Overheated gaskets



**Solution:** Inspect and replace the bushing/bushing gaskets

### 5.) Low oil level and/or leaks



**Probable cause:** Faulty gaskets, overloading



**Solution:** Inspect and replace the all gaskets on the main tank

### 6.) Contaminated oil



**Probable cause:** Faulty oil pump



**Solution:** Inspect oil pump for leaks, replace if necessary

## 7.) Low oil level for the sealed conservator system



**Probable cause:** Leaking air cell



**Solution:** Inspect and replace the air cell

## 8.) High oil temperature alarm



**Probable cause:** Overloading, failing radiator



**Solution:** Inspect and replace the radiator valves and gaskets

## GAUGES AND ALARMS

The transformer's gauges and alarms monitor and alert to various vitals, such as oil level, oil and winding temperatures, pressure or vacuum in the tank, oil flow and more.



We've listed three common gauge and alarm issues and the corresponding solution to extend the life of your transformers.

### 1.) Inaccurate gauge operation

 **Probable cause:** Cracked face or glass, stuck needle

 **Solution:** Inspect and replace affected gauges

### 2.) Pressure vacuum gauge at zero

 **Probable cause:** Check the gauge operation

 **Solution:** Inspect and replace the pressure vacuum gauge

### 3.) Nitrogen pressure alarm

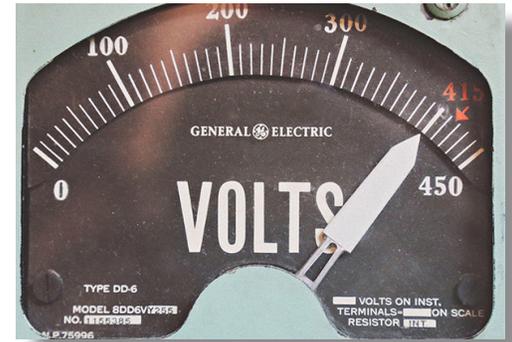
 **Probable cause:** Faulty gaskets; check the nitrogen bottle

 **Solution:** Inspect and replace the pressure vacuum gauge

## POWER AND VOLTAGE

A transformer's power and voltage are defined by the amount needed to keep equipment running properly. Fluctuations in these can lead to incorrect diagnosis, accessory failure or unit failure.

We've listed two potential issues and the solutions to them.



### 1.) Capacitance increases and/or there is abnormal tap voltage

**X** **Probable cause:** Cracked face or glass, stuck needle

**✓** **Solution:** Inspect and replace affected gauges

### 2.) The power factor is increasing

**X** **Probable cause:** Check the gauge operation

**✓** **Solution:** Inspect and replace the pressure vacuum gauge

## OTHER CONCERNS

If your transformer's problem is not listed, please call us at 800-727-8443 to speak with our technical specialists.



### 1.) High winding resistance



**Probable cause:** Poor contact or coking



**Solution:** Inspect and replace winding ratio, bushings and no-load tap changer

### 2.) Non-OSHA approved fan guards



**Probable cause:** Inspect fan guards to ensure they meet OSHA standards



**Solution:** Replace fan guards

### 3.) Abnormal number of LTC operations



**Probable cause:** Defective LTC control



**Solution:** Inspect mechanical control components, replace the LTC control

#### 4.) Rust or water accumulation around the control cabinet



**Probable cause:** Faulty heater element, gasket leaks



**Solution:** Inspect the control cabinet for leaks, replace the heater element

#### 5.) No circulation between the radiator and main tank



**Probable cause:** There should be no variation between temperatures



**Solution:** Inspect and replace the liquid level gauge



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