



TRANSFORMER CLINIC

Keep Powering On™





SAMPLE



Determining the health of your power transformer begins with Transformer Clinic's™ **SAMPLE** testing programs.

Overheating, arcing, partial discharge, and other active or slow-evolving faults, can all be identified during the **SAMPLE** process by using a combination of onsite and laboratory oil tests, such as Dissolved Gas Analysis (DGA) and Oil Quality Analysis.

DGA and oil quality tests are traditional testing methods that provide power transformer operators with an economical, yet marginal alternative to more advanced testing techniques. At Transformer Clinic™, our **SAMPLE** programs are utilized only as reliable first indicators, allowing specialists to further investigate areas of concern using Transformer Clinic's™ advanced **SCREEN** spot inspection programs.





SCREEN



Transformer Clinic's™ **SCREEN** spot inspection services provide an advanced level of instantaneous fault detection and location capabilities. A unique and purposeful range of advanced field-inspection techniques are utilized in a series of real-time spot checks to identify hot-spots and areas of concern.

The simultaneous use of these advanced techniques allow Transformer Clinic™ specialists to identify and characterize loose connections, arcing, partial

discharge, core clamping problems, unintentional core grounds, circulating currents, blocked radiators, localized overheating, mechanical defects, and/or high temperature faults from within a transformer.

When your transformer experiences sporadic symptoms, Transformer Clinic's™ **OBSERVE** overnight baseline services provide extended interval solutions to detect and locate faults at the most unexpected moments.

continued on reverse



TRANSFORMER
CLINIC

www.transformer.clinic



SCREEN



Technicians review post-inspection IR images to determine potential areas of concern

We deploy the most unique array of ultra-advanced inspection technologies in the industry.

- Accurately detect, measure, and locate flaws by “listening” to the sound of internal defects with Acoustic Emission (AE)
- Vibration Analysis (VA) measures and identifies areas of irregular or excessive in-service movement occurring within a unit
- Infrared Radiation (IR) precisely identifies hot-spots and heat signatures caused by faults and defects
- Detect and measure partial discharge impulse activity using High Frequency Current Transformer (HFCT) testing. The combination of AE and HFCT allows for optimal detection and location of electrical faults



TRANSFORMER
CLINIC

www.transformer.clinic



OBSERVE



When your power transformer's health issues remain evident, but symptoms seemingly come and go, extended oversight may be required to catch lurking issues at play.

Providing a similar, yet more elaborate arrangement of advanced technologies than those deployed during the **SCREEN** phase, our **OBSERVE** overnight baseline testing services allow our certified specialists to watch your transformers for extended

fault activity recording. As we log data during a 24-hour observation period, we can capture harmful issues as they occur.

After the 24-hour observation period concludes, Transformer Clinic™ specialists review all compiled inspection data to quickly issue operators an easy-to-understand summary of their findings, correlation with operating parameters in addition to their power transformer's condition ranking.

continued on reverse



TRANSFORMER
CLINIC

www.transformer.clinic



OBSERVE

Transformer Clinic's™ powerful condition ranking summary is amongst the most comprehensive reports available in the industry. We synergize results from a multitude of advanced and conventional inspection methods, in addition to technologies that help maintenance operators confidently make better and more informed decisions in their efforts to improve the in-market availability of their power transformers.

In the event your power transformer's symptoms require further analysis, or if you're simply being proactive, Transformer Clinic's™ **MONITOR** solutions provide your transformers with continuous, real-time, and around-the-clock health and condition monitoring to offer you ultimate peace-of-mind.



TRANSFORMER
CLINIC

www.transformer.clinic



MONITOR



Because power transformers are prone to the effects of unseen and untimely damage, early detection of abnormal and unforeseen situations is paramount.

Transformer Clinic's™ 24/7 continuous health status **MONITOR** piggy-backs off our parent company's field-proven and world-class acoustic emission (AE) technology, granting operators peace of mind. By deploying a complete

range of around-the-clock online and real-time AE and vibration activity, Transformer Clinic's™ 24/7 continuous health status **MONITOR** is capable of tracking one, a few, or an entire fleet of power transformers through a robust and easy-to-use web-based monitoring application. We generating real-time health and condition based summaries designed to help improve your transformer's in-market availability.

continued on reverse 



TRANSFORMER
CLINIC

www.transformer.clinic



MONITOR



Designed to monitor moderate to severe problem areas. Ultra-affordable, this system is perfect for simultaneous fleet monitoring.

Micro-SHM MONITOR System

OPERATION	Investment - \$\$
	Optimal Fleet Monitoring
	Multi System Deployment
ACTIVITY	Acoustic Emission
	Vibration
	Secondary Level Data
FAULT SENSITIVITY	Low Intensity
	Medium and High Intensity
CONFIGURABLE CH.	4 Channels
REPORTING	Web/Remote Access
	Multiple Plots Per Channel
	Zonal Location
	2D/3D Location
	Advanced Filtering



Capable of detecting minor faults and highly sensitive to severe activity, suitable for transformers requiring an intensive range of data and analytics.

Sensor-Highway MONITOR System

OPERATION	Investment - \$\$\$\$
	Fleet Monitoring
	Single System Deployment
ACTIVITY	Acoustic Emission
	Vibration
	Secondary Level Data
FAULT SENSITIVITY	Low Intensity
	Medium and High Intensity
CONFIGURABLE CH.	8/16/32 Channels
REPORTING	Web/Remote Access
	Multiple Plots Per Channel
	Zonal Location
	2D/3D Location
	Advanced Filtering



OFFLINE SERVICES

Has your power transformer been taken offline?
Not a problem, as Transformer Clinic™ offers a
unique line of Offline Services as well, including:



Sweep Frequency Response (SFRA) Testing Services

SFRA measurements provide a sensitive diagnostic technique for detecting changes in physical geometry and construction in a power transformer's windings by detecting defects and distortion.



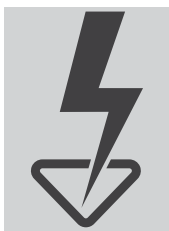
Winding Resistance Testing Services

This test is used to verify proper internal connections and determine whether open circuit condition or a high resistance connection are present in the windings, producing "hot spots" that could lead to gas generation.



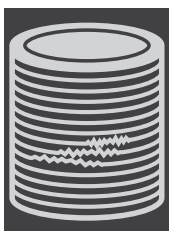
Dielectric Frequency Response Testing Services

The Dielectric Frequency Response testing technique diagnoses issues within insulating materials by measuring and calculating rates of impedance, capacitance, loss, and power factors. The results are used for insulation diagnosis of high and medium voltage equipment.



Insulation Resistance Testing Services

Several factors affect and cause a transformer's electrical insulation; aging, temperature, harsh environments, and contamination. The Insulation resistance test can detect when and if the insulating material has deterioration occurring.



Transformer Turn Ratio (TTR) Testing Services

The purpose of TTR is to help operators diagnose problems within their transformer's winding turns and other components. This test detects short-circuits within windings, in addition to the detection of load tap changer alignment issues.



Aside from our reliability programs, Transformer Clinic™ also offers a comprehensive line of a la carte on-line testing services, including:



ACOUSTIC EMISSION (AE) TESTING SERVICES AND CONTINUOUS MONITORING

AE is a powerful tool used to “listen” and register acoustic signals of different frequencies generated in a power transformer. Utilizing around-the-clock AE technology, AE monitoring provides continuous condition readings, processed and analyzed through proprietary software.



DGA AND OIL QUALITY TESTS (LABORATORY)

Provides valuable and reliable diagnostic information about the condition of the insulating system allowing identification of internal faults by analyzing the insulating oil. Combustible gas concentrations (PPM), and gas generating trends are calculated. Physical and dielectric properties of the oil are tested.



INFRARED (IR) TESTING SERVICES

Through thermographic imaging technology, Infrared imaging generates quick and accurate readings, locating and detecting abnormal heating signatures, or ‘hot spots’.



VIBRATION DIAGNOSTIC TESTING SERVICES AND CONTINUOUS MONITORING

Performed on in-service power transformers, Vibration tests serve as an additional method of continuous health status monitoring for the detection of mechanical deficiencies that typically do not lead to gas generation.



ELECTRICAL PARTIAL DISCHARGE

Electrical Partial Discharge detection uses High Frequency Current Transformers (HFCT). These sensors measure high frequency currents produced by partial discharge and/or arcing through a transformer grounding cable. The simultaneous use of AE and HFCT technologies allow the detection of electrical faults versus other sources.



SOUND MEASUREMENT SERVICES

Measurement of an audible sound originating from core and windings, which transmits through the dielectric fluid and/or structural supports to the outer shell or another solid surface, where it radiates as an airborne sound. The frequency spectrum of an audible sound consists primarily of the even harmonics of the power frequency.



TRANSIENT EARTH VOLTAGE (TEV) AND UT TESTING

Partial discharges can manifest in various ways. TEV sensors can be used to detect discharges from enclosed metal-clad switch gear. Ultrasonic sensors detect and measure surface discharges, and can determine asset conditions even without direct contact.





SAMPLE

Onsite and Laboratory Testing



SCREEN

Spot Inspection Testing



OBSERVE

Overnight Baseline Testing



MONITOR

24/7 Continuous Health Status



View our video or
visit us on the web at:
www.transformer.clinic



MISTRAS

T: +1 609.716.4162

F: +1 609.716.0706

Transformer Clinic™ by
MISTRAS Group, Inc.
195 Clarksville Road
Princeton Junction, NJ 08550

www.transformer.clinic

**Local Presence,
Global Reach!**

**MG
LISTED
NYSE**

300C-16100-01