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IRIS POWER
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Iris Power TGA

Periodic On-line Partial Discharge Monitoring Instrument

WORLDWIDE INDUSTRY ACCEPTANCE OF ON-LINE PD MONITORING

The partial discharge test has won worldwide acceptance with most major utilities and petrochemical companies. This general acceptance has been achieved because:

> Partial discharges are a symptom of most of the stator winding insulation failure processes

> The test has been proven effective in numerous installations by identifying generators and motors which require stator winding maintenance

> The test equipment is cost-effective

> The test is performed on-line and requires no electical machine shutdown

> Plant staff can perform the test, and interpret test results with minimal training

PERIODIC ON-LINE PARTIAL DISCHARGE MONITORING OF MOTORS & TURBINE GENERATORS

The test enables predictive maintenance on motor and turbine generator stator windings, resulting in increased availability and extension of operating life. The technique was introduced over two decades ago and has since been applied to over 10,000 motors and turbine generators to identify deteriorated stator windings. It is by far the most popular method in the world for measuring motor and generator partial discharge (PD).

The method is non-destructive and based on sound scientific and empirical principles and is recommended by manufacturers and industry standards such as the IEEE Std. 1434-2000, IEEE Std.1129 and IEC 60034-27-2.

The monitoring technique is based on the application of 80pF Iris Power Epoxy Mica Capacitors (EMCs) or Iris Power Stator Slot Coupler (SSC) partial discharge (PD) sensors, resulting in a high frequency measurement range and favorable signal-to-noise ratio. This enables the automatic separation and recording of both partial discharges and electrical noise, so that test results can be easily interpreted by users.

The most common method of monitoring motors and turbine generators involves using the Iris Power TGA-B™ or TGA-S portable instrument with multiple sets of permanently installed sensors (EMC or SSC). The instrument is controlled by means of a computer and includes Windows™-based control and data display software.

Alternatively, continuous monitoring systems are available from Qualitrol-Iris Power. They can be integrated with plant SCADA and facilitate remote monitoring.

Data Analysis and Information Outputs

Iris Power is foremost focused on providing a clear, reliable and repeatable result that allows the user to understand the true condition of the motor or generator and to make educated decisions on operations and maintenance. The TGA instrument has been designed to automatically collect partial discharge data and output the relevant information needed to provide a decisive means of:

- Identifying Partial Discharge Severity
- Identifying Probable Causes of Winding Deterioration
- Comparing Relative Health Across Machines

Five models of TGA are available

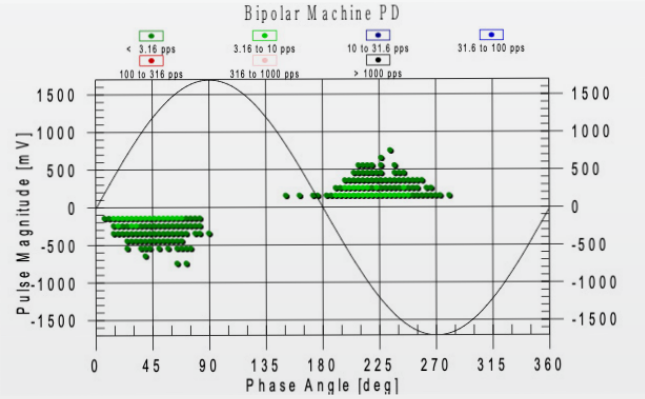
1. TGA-B - portable instrument for PD testing with busbar installed EMCs
2. TGA-BP - portable instrument for PD testing with busbar and hydrogenerator installed EMCs
3. TGA-S - portable instrument for PD testing with SSCs
4. TGA-SB - portable instrument for PD testing with SSCs and busbar installed EMCs
5. TGA-SP - portable instrument for PD testing with SSCs and hydrogenerator installed EMCs

PEAK PARTIAL DISCHARGE MAGNITUDE

Peak pulse magnitude (Qm) values are automatically calculated by the TGA instrument and output to help understand the relative health of each asset. The Qm value is defined in IEEE Std.1434 and IEC 60034-27-2 to allow several means of comparison including the following:

> Trending of Qm to show any major change in the rate of deterioration of the stator winding insulation

> Comparison of winding condition against similar machines using the freely available Iris Partial Discharge Severity Tables which are composed of over 550,000 test results collected across most makes and sizes of machine

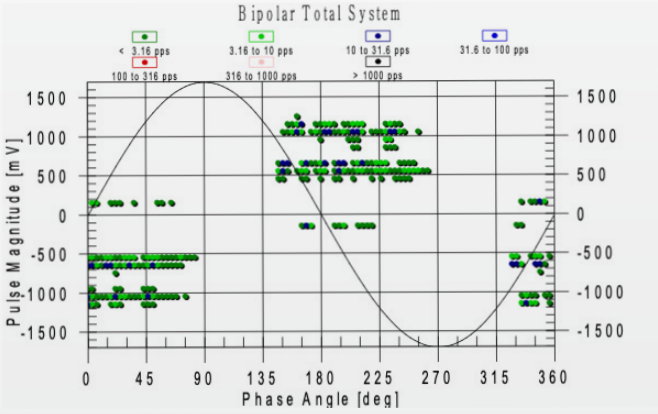


PHASE RESOLVED PARTIAL DISCHARGE PLOT SHOWING POSITIVE AND NEGATIVE PULSE MAGNITUDES (mV) AND PULSE COUNT (PULSES PER SECOND) AGAINST PHASE ANGLE OF AC CYCLE FOR MACHINE PD

MACHINE PARTIAL DISCHARGE

Electrical disturbances including partial discharges in the transmission lines (corona) or transformer as well as sparking of overhead cranes or on-site welding can create pulses similar to partial discharges. It is important to be able to understand the difference between power system noise and machine partial discharges to avoid false positive indications, to prevent unnecessary shutdowns and to avoid in-service failures.

The Iris Power TGA is designed specifically for Turbine Generators and Motors to ensure machine partial discharges are viewed and analyzed separately from system noises.



PHASE RESOLVED PARTIAL DISCHARGE PLOT SHOWING POSITIVE AND NEGATIVE PULSE MAGNITUDES (mV) AND PULSE COUNT (PULSES PER SECOND) AGAINST PHASE ANGLE OF AC CYCLE FOR SYSTEM DISTURBANCE

SEPARATION OF SYSTEM NOISE

Installation of two couplers per phase allows the TGA instrument to automatically distinguish between power system noise by evaluating pulse shape and the time of arrival of pulses.

Pulses originating outside the machine arrive at the instrument through the sensor closest to the system and can be automatically separated and classified as disturbances.

The pulses that arrive at the machine side sensor are automatically classified as machine partial discharges. Any pulses between the two sensors are automatically classified as pulses on the isolated phase bus.

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WHY TEST?

The TGA instrument has been designed to collect partial discharge data and output the relevant information needed to provide a decisive means of:

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> Identifying Probable Causes of Winding Deterioration
> Comparing Relative Health Across Machines

SPECIFICATIONS	
Frequency Bandwidth	0.1 MHz - 350 MHz
Phase Windows	100 phase windows per cycle
Pulse Amplitude Range	2 mV - 34,000 mV 10 Sensitivity Range Settings
Data Acquisition Time	1s or 5s per magnitude window
Ambient Sensors	Built in Ambient Temperature Sensor and Ambient Humidity Sensor
Sensor Compatibility	80 pF EMC (6.9kV - 35 kV) and/or SSC's,
Operating Temperature	-15°C to 45°C (5°F to 113°F)
Relative Humidity	Up to 95% non-condensing
Carrying Case Dimensions	41 x 31 x 21 cm (16" x 12" x 8")
Carrying Case Weight	10 kg (22 lbs)

FEATURES

> The on-line partial discharge test takes less than 30 minutes per machine with data collected in a simple, safe and non-destructive manner based on sound principles that are recommended by manufacturers and industry standards such as IEEE Std. 1434-2014 and IEC 60034-27-2: 2012

> The operator connects low voltage coaxial cable from the Iris Power TGA portable instrument to a coupler termination box. The TGA instrument is then connected to a control computer that runs the PDLitePro and PDView software using a USB or Ethernet cable

> The test is initiated through the PDLitePro software which automatically collects the partial discharge data while the machine is running and without any interference to normal operation of the generator

> Advanced noise separation based on pulse shape and time of arrival methods to consistently quantify and isolate partial discharges from system disturbances

> Test frequency range from 40 MHz to 350 MHz while working with 80 pF Epoxy Mica Capacitors (EMCs) and 2 MHz to 350 MHz with 1 - 2 nF capacitive couplers and up to 800 MHz with SSC

> Optional capability for off-line partial discharge testing of individual stator bars, coils and windings

> Ability to operate instrument from 12V battery pack

GET IN TOUCH

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