

INSTRUMENTS

*BusTrac*TM



*Continuous On-Line Partial Discharge
Monitoring for Turbine Generators*



What is Partial Discharge?

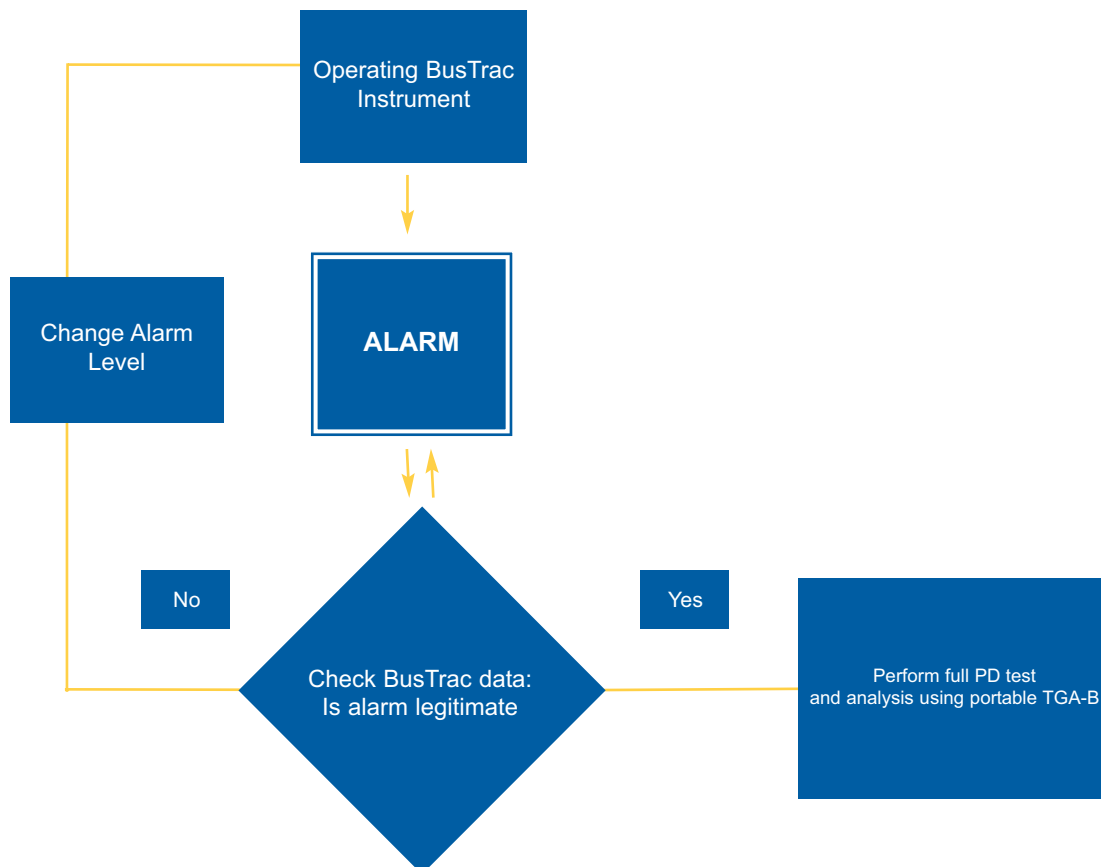
Partial discharges (PD) are small electrical sparks that occur within the high voltage electrical insulation in stator windings. PD occurs whenever there are small air-gaps or voids in or on the surface of the insulation. Normally, well-made stator windings that are in good condition display very little PD activity. However, over 50 years experience has shown that as a stator winding deteriorates from winding vibration, operation at high temperatures, or contamination from oil, moisture and other chemicals, the PD activity will increase by a factor of ten or more. Thus, on-line PD monitoring detects the main root causes of stator winding failure. Since PD monitoring can be performed during normal motor or generator operation, and generally gives two or more years of warning indicating a risk of failure, on-line PD monitoring has become a very powerful tool for predictive maintenance.

Some benefits of PD monitoring of the stator winding are:

- ✓ Increased availability of machines
- ✓ Plan maintenance based on actual conditions
- ✓ Significant reduction of in-service failures



Stator Winding Failure



Benefits of Continuous Monitoring

Motors and generators have a performance record of being highly reliable, however, studies indicate that approximately 40% of all failures can be attributed to the gradual aging and deterioration of the stator winding insulation. On-line, periodic partial discharge testing has been successfully employed since 1951 in diagnosing accumulated winding-related problems in different types of generators. Unlike periodic on-line PD testing, the BusTrac™ monitor provides maintenance professionals with an opportunity to continuously track PD activity.

Benefits of continuous monitoring:

- ✓ remote PD monitoring
- ✓ maximize collection of PD activity
- ✓ maximize warning of pending problems
- ✓ create a smoother trend curve (i.e. more data points)



Alarm Output Module (AOM)

Trac instruments fitted with this option can generate an analog alarm signal based on user-defined PD activity levels. This alarm output can then be wired to an annunciator, or a plant monitoring system. Two outputs are provided, one, which is latched, and one that is a momentary contact (four seconds).

Analog Signal Output Module (ASOM)

The ASOM allows the Trac instrument to generate analog output signal levels, which are proportional to the NQN and Qm partial discharge summary numbers. These signals can then be fed into a plant acquisition system where they can be trended and stored. Utilizing this option allows the Trac instrument to be treated like any other field sensor and allows PD data display, alarming, and trending to be integrated with other plant systems under an interface familiar to plant personnel.

How Does the BusTrac™ Monitor Work?

The BusTrac™ monitor is the latest in continuous on-line monitoring of PD activity in turbine generator stator windings. The BusTrac™ instrument is your alarm system for monitoring the health of stator winding insulation. BusTrac™ monitor uses unique methods of noise separation, specifically designed to overcome electrical interference that is typical of all power plant environments. This ensures reliable and repeatable measurements by minimizing the risk of false alarms. The test data can be easily interpreted by a maintenance professional that participates in a one-day training seminar, offered by our PD experts. Since the instrument is fully compatible with all previous generations of the BUS coupler technology, maintenance personnel can use the historical data to make a seamless comparison to similar machines, and they can continue to solicit access to the growing Iris database of over 60,000 test results.

Installation & Communication Options

Facilities that have existing BUS coupler installations can easily install the BusTrac™ monitor by connecting the instrument to the existing coupler termination panel. The install of the BusTrac™ monitor does not require an outage. Our field service specialists can install and/or commission your BusTrac™ instrument so that alarm trigger levels and condition based measurement triggers are set to the best levels for that particular machine. The BusTrac™ monitor offers a multitude of communication options. The monitor(s) can be wired via direct serial cable to the front panel RS232 connector. It can also be remotely accessed when wired RS485, Ethernet or fibre optic cable to either a terminal server or hub. For more information on what communication options would best suit your needs, please contact your Iris sales representative.

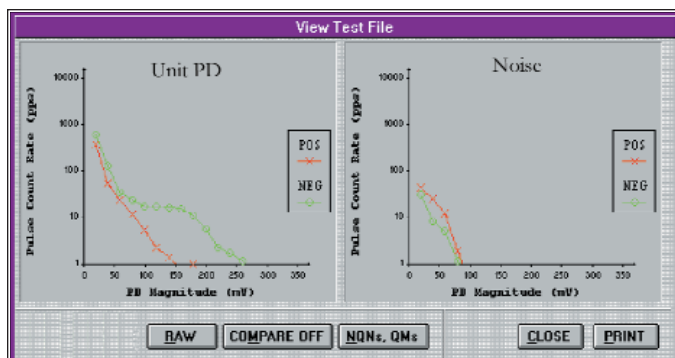


Software

The archived PD data can be downloaded using our Windows™ based software, TracCon, either locally through the RS232 port, or remotely using the RS485, fibre optic, or Ethernet (TCP/IP) network communication.

The BusTrac™ instrument is supplied with a termination panel that contains a multiplexer allowing the sequential monitoring of up to 9 couplers in cross-compound generators. The instrument can be set to run in one of two operating modes, autonomously and controlled. Autonomous allows the BusTrac™ instrument to run without interruption, data can then be downloaded from the instrument via RS232 or RS485 connection. Controlled mode allows a user to interface locally or remotely via a network connection between the Trac(s) and the TracCon controlling computer. The test results can be viewed immediately and analyzed using our PDView™ reporting and interpreting software.

The BusTrac™ instrument can collect data continuously, taking a measurement every 2 minutes, and archiving summary data (NQN, Qm) that are essential for the trending and comparison of the insulation condition to other similar turbine generators.



Features

- Sophisticated monitoring and analysis system reduces false indications by digitally separating partial discharges from electrical noise, on a pulse-by-pulse basis.
- Proven filtering and pattern recognition enhances noise separation, allowing for a reliable and objective detection of poor impregnation, overheated windings, coil movement in the slot, ineffective or deteriorating grading/semi-conductive paint problems and contamination.
- The BusTrac™ system consists of six 80pF capacitors installed two per phase, one as close to the machine terminal as possible and one further along toward the power system end.
- The system's compatibility with our TGA-B technology allows users with existing sensor installations to commission the system without an additional outage. (Data can be easily confirmed and further analyzed with Iris' TGA-B portable instrument).
- Optional remote modes of communication permit command, control and configuration from a distance. For example, the key trending parameters can be transmitted to a plant operating system, and correlated with operating parameters such as turbine generator load and temperature for enhanced analysis of stator winding problems.
- Ensures a consistent testing interval, therefore improving the quality of the trends.
- The optional alarm output permits maintenance personnel to focus on machines that exhibit unusual or high levels of partial discharge activity.



Iris Power
1 Westside Drive, Unit 2
Toronto, Ontario M9C 1B2
Canada
Telephone: 416-620-5600
Fax: 416-620-1995

Iris Power Koch-Glitsch
4800 Sugar Grove Blvd. #290
Stafford, Texas 77477
USA
Telephone: 281-207-5322
Fax: 281-207-5323

Iris Power
(A Division of Koch Glitsch India P Ltd)
1105, Modi Tower, Nehru Place
New Delhi, India 110019
Phone: +91-11-4180-8470
Fax: +91-11-4180-8471