Solutions for Condition-Based Maintenance

PDMonitor
Online Partial Discharge Monitoring System

The Future of OLPD

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1. Introduction
2. Features and Benefits
3. System Configurations
4. PDMonitor Software
5. How to Use PDMonitor
The PDMonitor is customized to conduct real-time online monitoring to detect and locate the potential failures before they lead to breakdown or catastrophic failure in power assets as well as provide maintenance suggestions. This system is trusted to avoid insulation faults at an early stage and improve the safety and reliability of electrical assets.

**Applications of PDMonitor**
- PDMonitor for GIS online PD monitoring system
- PDMonitor for Transformer online PD monitoring system
- PDMonitor for Power Cable online PD monitoring system
- PDMonitor for Switchgear online PD monitoring system
The PDMonitor system consists of Main Units, sensors, and a Diagnostic Server Unit (DSU).

Signals are collected through the MEUs and then processed by the PDMonitor software within the Diagnostic Server Unit (DSU).

If detected, the PD type and approximate location are identified, and maintenance suggestions are provided.
### Features

<table>
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<tr>
<th>Feature</th>
<th>Description</th>
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<tr>
<td>High speed data sampling and processing in real time</td>
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<td>Displays PRPD, PRPS, $-q$, $-n$, $q-n$, $q-t$, and $n-t$ data spectrums with diagnostic results for each channel in real time</td>
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<td>The PDMonitor software identifies the possible PD type through PMDT’s intelligent diagnostic algorithm</td>
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<td>Supports historical trend analysis and data record inquiry</td>
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<td>Alarms are sent automatically when the monitored signals reach the pre-set alarm parameters</td>
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<td>The PDMonitor software has built-in Fingerprint Library with typical PD and noise characteristics database</td>
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<td>Supports TCP/IP and IEC61850 communication protocols</td>
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<td>Supports remote visit and database export/import</td>
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<td>The system can support more than 250 MEUs. Each MEU supports up to 8 channels which can collect signals simultaneously.</td>
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## Benefits

- Provides early warning
- Prevents expensive accidental catastrophic failures due to PD activity
- Reduces unscheduled down time
- Reduces inspection and maintenance costs
- Improves the maintenance efficiency
- Improve power supply quality and reliability
- Extends power asset life
Monitoring Endpoint Units (MEU)

- The MEU connects with the sensors via coaxial cables and has built-in memory for storing the data collected. It collects data continuously from sensors, processes it, and uploads it to the DSU through fiber optics cable.
- Up to 4 MEUs can be installed in one cabinet near the asset.
Diagnostic Server Unit (DSU)

- The DSU cabinet contains the circuitry which receives the optical data streams of the detected PD pulses, processes the pulses, and measures the signal amplitude. It also includes the circuitry to transmit and receive the monitoring information from all MEUs.
System Configurations

Internal UHF Sensor

- The Internal Ultra-High Frequency (UHF) sensor is installed inside of the power asset to detect the internal signals and analyze them for PD. Current design for PMDT’s Internal UHF sensor in its 3rd generation.
- High detection sensitivity and is effective in isolating ambient noise signals
- One-time casting mold and has a life expectancy the same as the power equipment
- Reliable and safe to use as all metal parts are grounded
- Unique structure and design provide reliable sealing between the sensor and the power equipment
- Complies with the running temperature and pressure environment of power equipment
External UHF Sensor

- It detects UHF signals emitted by PD activities in power equipment and is placed at the appropriate location for optimal results. It features high detection sensitivity and is effective in isolating ambient noise signals.
Internal UHF sensor is placed and tied around the insulator disc for online PD monitoring.
The High Frequency Current Transformer (HFCT) sensor employs split-core design and is used to detect the HFCT signals emitted by PD activity through a clamp connection around the ground/neutral straps or power cables of the power equipment.
System Configurations

AE Contact Sensor

- The Acoustic Emission (AE) sensor is used to pick up ultrasonic vibrations created by sound waves from within the sealed power equipment. Magnetic holders are used to hold the AE Sensor in place so that they won’t move around or drop when making contact with the surface of the equipment.

- The AE sensor is used in conjunction with the UHF or HFCT sensor by comparing the two signals. This allows for the utilization of a method called Acoustic−Electromagnetic detection. This helps ensure the best results when performing analysis on the incoming signals.
The Ultrasonic sensor is used to pick up ultrasonic vibrations created by sound waves through the air within the switchgear. This is done in conjunction with the UHF or HFCT sensor by comparing the two signals. This allows for the utilization of a method called Acoustic-Electromagnetic detection, which helps ensure the best results when performing analysis on the incoming signals.
System Configurations

TEV Sensors

- The TEV sensor is a capacitive probe used to measure the TEV signal generated by PD occurring in or near switchgear equipment. It measures the peak amplitude of the instantaneous voltage pulse of PD effectively.
The PDMonitor Software is installed on the Diagnostic Server Unit (DSU) to monitor, analyze and process PD signals from Power Equipment in real time. It mainly consists of Data Acquisition Control and Data Analysis Modules.

The Data Acquisition Control Module controls the Monitoring Endpoint Unit (MEU) to collect data. The Data Analysis Module conducts data diagnostic and records inquiries.
Software Main Features

- Identifies PD types and disturbance signals through statistics and Intelligent Diagnostic Technology
- Built-in typical PD and disturbance characteristics database
- Historical trend statistics and data records inquiries
- Displays PRPSfPRPS spectrums
- Partial discharge alarm
- Compatible with IEC61850 communication protocol
- Supports external data access and data export
Sensor Layout
Software Interfaces

Real Time Data Display

Database Record
Software Interfaces

Historical Data Analysis

Historical Trend
How to Use The PD Monitor for GIS

DMonitor for GIS
How to Use The PDMonitor

DMonitor for Power Cable
How to Use The PDMonitor

PDMonitor for Switchgear
Thank You
POWER MONITORING AND DIAGNOSTIC TECHNOLOGY LTD.