PDiagnosticM

Portable Short-Term Online Partial Discharge Monitoring System

A State-Of-The-Art, Portable, Online Partial Discharge Monitoring System for Short-Term PD Monitoring on Electric Power Equipment with Data Diagnostic Software, Cloud Diagnostic Technology, and PDMonitor App

PMDT

Solutions for Condition-Based Maintenance

Our Mission

Increase the operational reliability and safety of power systems globally.

Global Application

Our products and services have been widely adopted by major electric utilities and industrial end users throughout the United States and in a number of countries and regions such as Canada, Switzerland, Saudi Arabia, Colombia, China, Singapore, India, Malaysia, Indonesia, Vietnam, South Korea, Philippines, Thailand, Hong Kong, Taiwan, and more.

With our proven, high-quality products and complete solutions, we possess notable references in various industries like Oil & Gas, Metals & Metallurgy, Chemical, Power Industry Manufacturing, Electronics Manufacturing, Commercial Buildings, Government, and more.

Customer Oriented

Customer satisfaction is of the utmost importance for PMDT. We strive to provide increased operational reliability and safety of power systems and are devoted to providing superior user experiences and consistently reliable customer support.

We aim to pursue long-term strategic partnerships with our customers, and to create added value for them now and into the future.

About PMDT

PMDT provides solutions worldwide for condition-based maintenance to the power industry. Our company has knowledgeable and experienced personnel that utilize the most advanced resources for online testing. Over 20 years of ongoing research and development into power asset condition assessment aids for our wide array of diagnostic and monitoring systems for medium and high voltage substations.

Our headquarters and manufacturing facility is located in San Jose, CA, US, which provides local access to high quality American-made components. We provide reliable and robust equipment with state-of-the-art capabilities for online testing of energized power equipment.

PMDT meets ISO9001: 2008 Quality Management System requirements and our products have passed laboratory tests and inspections.

PMDT continuously puts forth an abundant R&D investment to provide perpetually better solutions for condition-based maintenance programs.

PDiagnosticM

Short-Term Online Partial Discharge Monitoring System

The PDiagnosticM is a portable system that utilizes UHF, AE, and HFCT sensor modules to monitor PD signals from Medium and High Voltage power equipment.

The system is ideal for monitoring critical power assets to find and monitor intermittent PD signals and to analyze the developing PD trends. The PD type is determined by automatic pattern recognition and internal defects can be found at an early stage.

The system provides advanced protection with alarm functions and our Deep Learning data analysis capabilities utilizing our proprietary Intelligent Cloud Diagnostic Technology.

Applications

- MV & HV Switchgear
- Transformers
- Power Cables
- Gas Insulated Switchgear (GIS)
- And Other Equipment

Main Features

- Monitors for PD in real time via 10 customizable channels simultaneously
- Acoustic-electric combination detection/analysis technology is adopted for superior data analysis
- Provides PRPD, PRPS, AE amplitude, and AE waveform spectrums
- Features adjustable data sampling intervals, adjustable alarm thresholds, data trending, and automatic PD diagnostic results with PD type(s) or noise to determine the severity.
- Employs weatherproof design which is suitable for both outdoor and indoor use, and is ideal for short-term monitoring requirements with fast and easy installation.
- Advanced data diagnostic capability by utilizing Deep Learning via our PMDTCloud
- Connects to the network via 3G/4G and transmits data to the PMDTCloud
- The PMDTCloud manages multiple assets from numerous substations with several users - simultaneously from one server
- Login to the PMDTCloud via any secured web-enabled device for access to the latest data and current asset condition information
- An Android/IOS smart phone application is supplied with the PMDTCloud for users to view the data and displays alarms in real time

Insight into the PDiagnosticM

The Proven Solution for Condition Monitoring of Your Critical Power Assets

The Challenge

Partial discharges (PD) are a localized dielectric breakdown of a small portion of a solid or fluid electrical insulation system under high voltage (HV) stress. In medium and high voltage insulation PD begins when the voltage stress exceeds the breakdown strength in a portion of the insulating material.

In electric power equipment, oil, paper, and other insulating mediums are used in many components of the asset. PD can begin in any portion of these insulating materials. Once it begins, although it may be intermittent in nature, PD will always deteriorate the insulation and eventually cause complete breakdown of the insulation resulting in equipment failure.

This well-known fact makes the PDiagnosticM an essential tool in your asset management program. Spot checks or time-based maintenance is important; but due to the intermittent nature of insulation breakdown, these methods can be unreliable at times. Changes in environment, temperature, loading, and moisture are all factors in partial discharge activity. In critical assets, an extendable short-term PD monitoring can provide more details on the PD activity over time and can also provide a unique insight into PD activity at different times during the life cycle of the asset.

The power equipment may be subjected to changes in load, temperature, and surrounding environment through the course of the day, week, and/or month. Sampling the PD data once a year may not provide the in-depth information needed for a complex or critical asset.

The Solution

In order to ensure the stability and safety of the power system, it is critical to maintain routine inspections of the power equipment with the use of our acoustic, UHF, and HFCT signal analysis equipment. The PDiagnosticM will help you discover insulation issues or degradation either due to normal aging or some kind of internal issue. PD signals analysis helps find any issue of the insulation system, which is typically one of the first indications of the degradation and aging of the equipment's insulation.

The portable PDiagnosticM is the proven solution for these concerns and more. It has been widely used and highly recognized by major utilities across the US and around the globe.

The advanced PDiagnosticM algorithm can eliminate interferences, identify types of insulation defects or deterioration, and evaluate the insulation condition of MV/HV equipment. This makes the PDiagnosticM ideal for providing the necessary information to prioritize power equipment maintenance or replacement strategies.

Has your company ever faced a situation where intermittent PD signals have been detected on power assets that are critical to your daily operations? Or a situation where critical PD has been found and located on the power asset, however more time is needed to schedule for shut-down and maintenance of the power asset? Or abnormal gas or oil analysis results indicating a potential problem with the asset?

A portable weatherproof 10 channel monitor, collecting and analyzing data from any location, twenty-four hours a day, 7 days a week, all while utilizing 3G/4G data capability and our Intelligent Cloud Diagnostic Technology - the PDiagnosticM is the solution to all your PD related issues.

System Configurations

The PDiagnosticM system consists of a Main Unit, AE sensor modules, UHF sensor modules, HFCT sensor modules, PDiagnosticM Software for customer installation, PMDTCloud (optional), and cables.

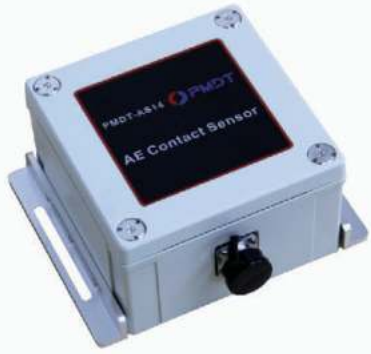
The system has 10 customizable channels. Our recommended channel configuration consists of 4 UHF sensor modules, 3 AE contact sensor modules, and 3 HFCT sensor modules. However, the system can be configured with almost any combination of UHF, AE, and HFCT sensor modules depending on the needs of the customer.

UHF Sensor Module

The Ultra High Frequency (UHF) sensor module detects UHF signals originating from the power equipment. They are placed according to the equipment structure and probable signal propagation.

PDiagnosticM Main Unit

The PDiagnosticM Main Unit consists of a signal processor, data acquisition module, intelligent analysis microcomputer, and a communication and control unit. It collects and processes the detected signals, and sends the collected data to a local laptop via Ethernet or to the PMDTCloud via 3G/4G internet network for data analysis.



AE Contact Sensor Module

Acoustic Emissions (AE) contact sensor modules are attached on the surface of the power equipment's grounded exterior to detect acoustic signals. Magnetic AE sensor holders are used to hold AE sensors on the body of the enclosure.

The AE Sensors are used to compare the acoustic signals to the electromagnetic signals to analyze the signals. Utilizing acoustic-electromagnetic combination detection technology can enhance the confidence of PD analysis of the system.

HFCT Sensor Module

High Frequency Current Transformer (HFCT) sensor modules are used to detect high frequency current signals utilizing a split-core design allowing them to be placed around the ground/neutral straps of cables or power equipment.

Sensor Case

PMDTCloud

Asset Condition Monitoring and Diagnostic Data Management System

The PMDTCloud is a cutting-edge, cloud-based asset condition monitoring and diagnostic data management system software that communicates with various of our products to collect and analyze the test/monitoring data. It is developed based on the innovations in internet technologies and the Internet of Things. It employs a multi-dimensional cloud diagnostics algorithm developed by PMDT through the utilization of the latest big data computing, cloud calculation, and deep learning technology based on our abundant on-site field test data collected through the years.

The PMDTCloud provides users with a faster method to access the latest data and condition of the power assets from any authorized web enabled device via a login with a user ID and password. Diagnostic results with PD types are provided automatically.

The PMDTCloud includes the following functionality: deep learning, cloud diagnostic, test job/project management, alarms, report generation, and operational status indicators of the substation(s).

The PDiagnosticM connects to the PMDTCloud via a 3G/4G/internet connection to transmit the monitoring data. The data is analyzed by the Cloud utilizing advanced Deep Learning Technology.

Multiple Statistics Charts

Cloud Diagnostics

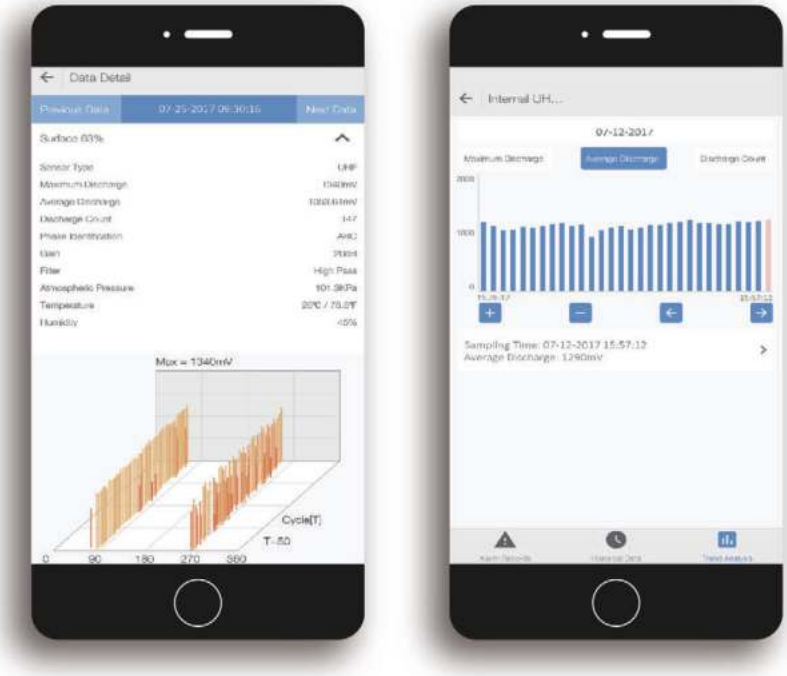
Cloud Trend Analysis

PDMonitor App

Data Management Application

The Android/IOS PDMonitor smart phone application is supplied with the PMDTCloud for users to view the condition data from the Cloud. The data spectrums, alarm data and records, historic data trends, trend analysis, and so on can be viewed on the PDMonitor Application in real time.

Alarms are sent from the PMDTCloud via a visual indicator and audio signal through the speakers of the connected computer to alert the user immediately when an alarm is activated. The PDMonitor application will also display alarms automatically as it receives information from the PMDTCloud. The power asset condition is evaluated by the PMDTCloud.



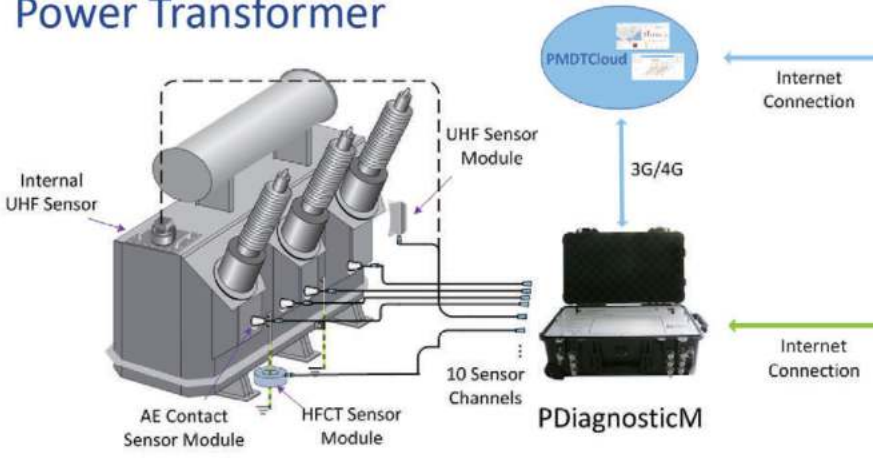
PDiagnosticM Software

The PDiagnosticM software is typically installed on a laptop that communicates with the PDiagnosticM Main Unit through an Ethernet cable. The software identifies the possible PD type and the general area of the defects. The software also displays the current configurations of the PDiagnosticM system, and the parameters of the system can be set to the customer's specifications. The main features are as follows:

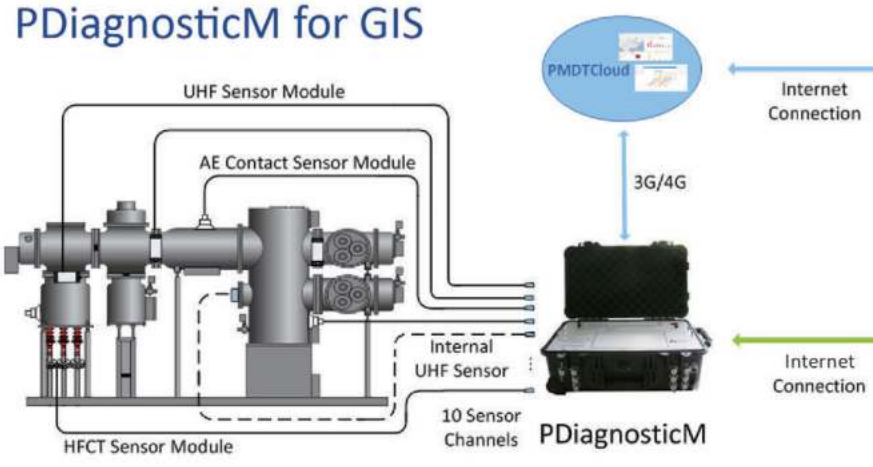
- Displays the data detected from each channel in real time
- Database system to save and record all the monitoring data
- Data acquisition control and analysis
- Determines the PD type automatically with a built-in typical PD and disturbance characteristic database
- Analyzes and processes the historic data in the database through statistics and intelligent diagnostic technology and provides partial discharge trends over time
- Expert diagnostic function to generate reports automatically

How to Use the PDiagnosticM System

PDiagnosticM for Power Transformer



PDiagnosticM for GIS



User

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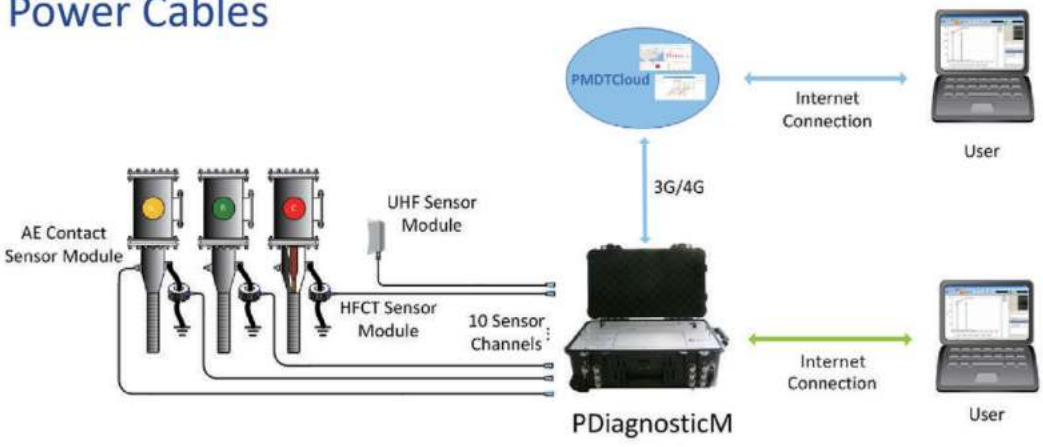
PDiagnosticM for Power Cables



User

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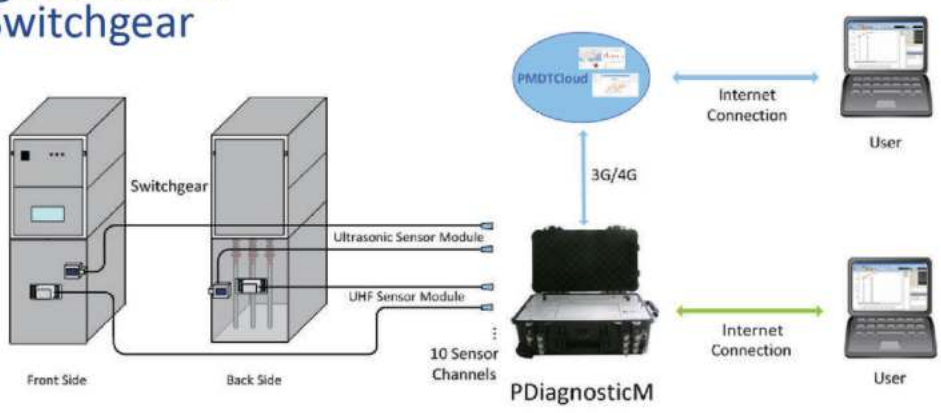
PDiagnosticM for MV Switchgear



Technical Specifications

PDiagnosticM Main Unit	
Channel Qty.	10
Communication	3G/4G/Ethernet
Synchronization Methods	Power sync.
Dimensions (LxWxH)	21.7" x 13.8" x 9.1" 55cm x 35cm x 23cm
Weight	22lbs / 10kg
UHF Sensor Module	
Bandwidth	300MHz~1.5GHz
Measurement Range	0dB~70dB
Gain	0dB/20dB
Filters	All pass, Low pass, and High pass
AE Contact Sensor Module	
Bandwidth	AE sensor for GIS: 20kHz~80kHz AE sensor for Transformer: 80kHz~300kHz
Gain	0dB/20dB/40dB
HFCT Sensor Module	
Bandwidth	500kHz~50MHz
Measurement Range	0dB~80dB
Gain	-60dB/-40dB/-20dB/0dB
Environmental	
Operating Temperature	5°F~131°F / -15°C~55°C
Humidity	0-90% RH non-condensing
IP Rating	IP65
Power Supply	
Power Supply	85V~264V AC, 50/60Hz

The PDiagnosticM and the PDiagnostic

The PDiagnosticM and the PDiagnostic are two different systems with different features. Choose one of the two or both systems according to your needs.

Short-Term Online PD Monitoring for Critical Assets

PDiagnosticM

The portable, online PD monitoring system for short-term PD monitoring of a critical power asset, utilizing PMDT's proprietary Intelligent Cloud Diagnostic Technology. With 3G/4G data capability, this system allows for remote monitoring, alarm functions, and analyzing the data by utilizing the Deep Learning Technology.

Online PD Diagnostic and Location

PDiagnostic

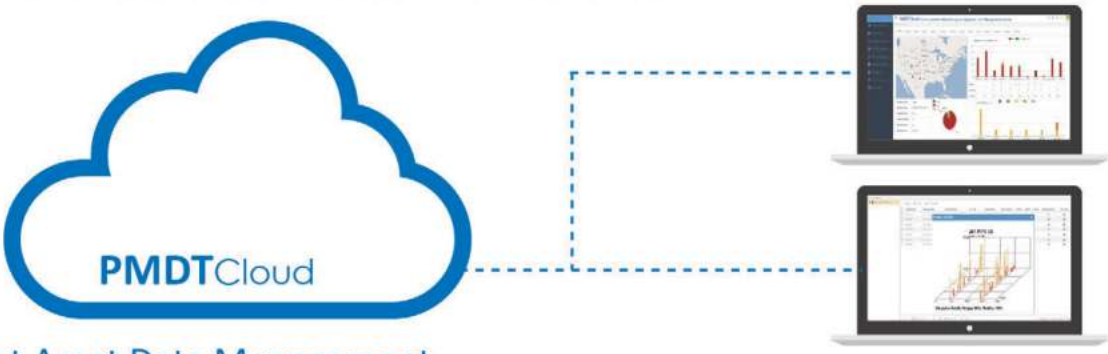
The portable, multi-channel PDiagnostic system locates PD on power equipment down to a meter by utilizing Acoustic-Electromagnetic Combination Location Technique, Time Difference of Signals' Arrival (TDOA), Partial Discharge Signals Separation (PDSS), and 3D Positioning Technologies with PC software included. The system features advanced PD diagnostic and location capabilities.

Global Testing Experiences

PMDT's unique experiences consist of over 20 years of R&D combined with many years of field work: testing PD and Infrared for over 180,000 various power assets in thousands of substations globally for a variety of electric utilities, industrial end users, and power equipment manufacturers. PMDT has the expertise needed to provide the best Condition-Based Maintenance Programs for your power assets.

The PMDT Solution

Solutions for Condition-Based Maintenance



Intelligent Asset Data Management

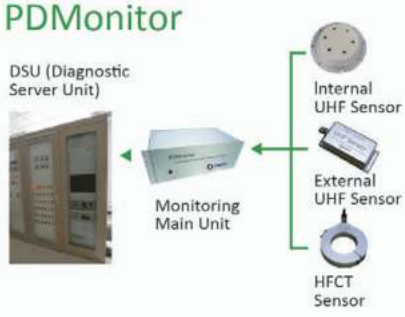
Detection and Monitoring

Online PD&IR Testing

PMDTiSmart

Wireless Autonomous Online PD Testing

PDMonitor



Permanent Online PD Monitoring

Diagnostic and Location

Online PD Diagnostic and Location

Online PD Expert Diagnostic and Location

Short-Term Online PD Monitoring for Critical Assets

Always Leading

Continuous Efforts to Provide New and Improved Solutions for Condition-Based Maintenance Programs

PMDTCloud

The PMDTCloud is a cutting-edge power asset condition monitoring data management system integrated with test and monitoring data collection, recording, management, trending, analysis, and diagnostic functions. PMDT's test instruments and monitoring systems connect to the PMDTCloud via 4G/3G/Wi-Fi to upload the data collected, download test tasks, and receive diagnostic results. The Cloud analyzes the data by utilizing the Deep Learning technology.

OLPD Testing

PDetector

The Handheld PDetector allows for quick OLPD testing to be conducted on all types of power equipment to identify which assets have abnormal PD signals, and determine the PD type by using multiple data spectrums analysis such as amplitude, waveforms, and PRPD-PRPS spectrums. A PDetector Smart Phone / Tablet Application and PC software are included, and optional PMDTCloud diagnostic service is available.

Combined OLPD & IR Testing

PDStar

Intelligent Handheld Partial Discharge Detectors with a 4.3" touch screen and a Thermal Imaging camera. A HFCT Signal Processor with 100 MSPS (Mega-Samples per Second) sampling rate is provided featuring time and frequency analysis for online power cable testing and diagnostics. PC software is included and optional PMDTCloud diagnostic service available.

Wireless Autonomous Online PD Testing

PMDTiSmart

The Smart Sensors are a revolutionary design which builds a wireless smart sensor network to autonomously sample asset condition data periodically from all kinds of power equipment. The test data is collected wirelessly and uploaded to the PC-based software and/or the PMDTCloud for data diagnostics. The system provides a solution for NFPA's 70E 2015 more restricted approach boundary for live assets. PC software is included and optional PMDTCloud diagnostic service available.

Permanent Continuous Online PD Monitoring

PDMonitor

Online PD Continuous Monitoring Systems used to monitor and analyze the PD signals emitted from the power equipment in real time. The software features historical trend statistics, data record inquiry, alarm functions, and a built-in database of PD & noise characteristics spectrums. The system features high speed data sampling & processing modules and supports the IEC 61850 communication protocol.

Online PD Diagnostic and Location

PDiagnostic

The portable, multi-channel PDiagnostic system locates PD on power equipment down to a meter by utilizing Acoustic-Electromagnetic Combination Location Technique, Time Difference of Signals' Arrival (TDOA), Partial Discharge Signals Separation (PDSS), and 3D Positioning Technologies with PC software included. The system features advanced PD diagnostic and location capabilities.

Online PD Expert Diagnostic and Location

PDExpert & Service

The portable multi-channel PDExpert system locates PD on power equipment within centimeters by analyzing original waveforms and using Acoustic-Electromagnetic Combination Location Technique. PC software is included. PMDT also provides Expert testing and location services.

Short-Term Online PD Monitoring for Critical Assets

PDiagnosticM

The portable, online PD monitoring system for short-term PD monitoring of a critical power asset, utilizing PMDT's proprietary Intelligent Cloud Diagnostic Technology. With 3G/4G data capability, this system allows for remote monitoring, alarm functions, and analyzing the data by utilizing the Deep Learning Technology.

Solutions for
Condition-Based Maintenance

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