



The rotating machine monitor (RMM) is a continuous partial discharge monitor, which also monitors, stores, and correlates operating dynamics. All industry accepted partial discharge graphical results and IEC defined quantities are measured, calculated and recorded.

The RMM provides information as to the health of the stator winding insulation in medium and high voltage motors and generators, and can be used on variable frequency drives (VFD).

The RMM's communication options provide timely access to information and notifications to assist asset management and maintenance personnel in their decision making process.

Design Advantages

No other partial discharge monitor in the market has all the features and functions of the Dynamic Ratings RMM. The RMM features a minimum of fifteen independent (concurrently monitored), highly sensitive, user configurable input channels; delivering the industry's best signal-to-noise ratio and allowing connection to any brand of PD sensor!

The RMM is more than just a Partial Discharge (PD) monitor. Inputs are available for six RTD winding temperatures, three load currents, three voltages and six user defined (4 - 20 mA) inputs. The RMM has the capability to perform motor current signature analysis for the detection of broken rotor bars in induction machines. The RMM will store up to two years of data using a first-in, first-out (FIFO) method.

Features & Benefits

- The RMM's design allows for independent operation (without a connected PC) yet features a wide variety of built-in communication abilities.
- Common operating characteristics are: ambient and winding temperatures, humidity, and load current.
- Designed for harsh ambient conditions including a wide temperature range of -40° C to 70° C (-40° F to 158° F), without the need of additional heating or cooling.
- When placed in an approved enclosure, the RMM can be used in many locations.
- A full range of advanced noise cancellation capabilities includes the elimination of cross coupled signals.
- The supplied application software allows for configuration, uploading of stored data and analysis.
- The RMM is designed to operate with existing or already installed PD sensors. This saves the purchasing, engineering and installation costs of new sensors.

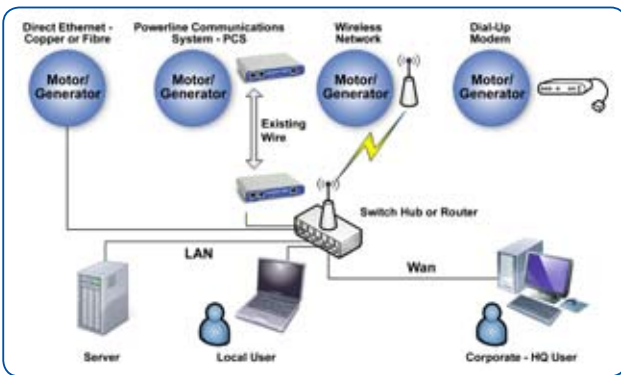
Applications

- Hydro & Turbo Generators
- Motors, Including VFD's
- Connected Bus Duct or Cables



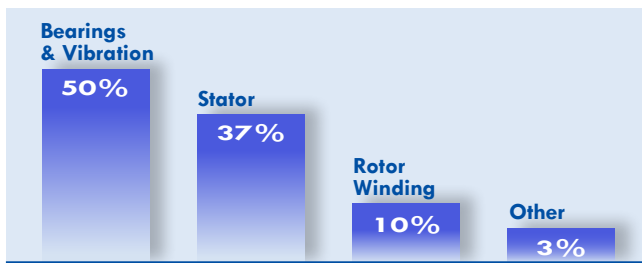
A Wide Variety of Connectivity and Communication Solutions

Communications ports include Ethernet, USB and RS-485 with a standard communication protocol using ModBus. DNP-3 is available upon request. Dry relay contacts are also available to indicate monitor health and alarm conditions.



Equipment Failures

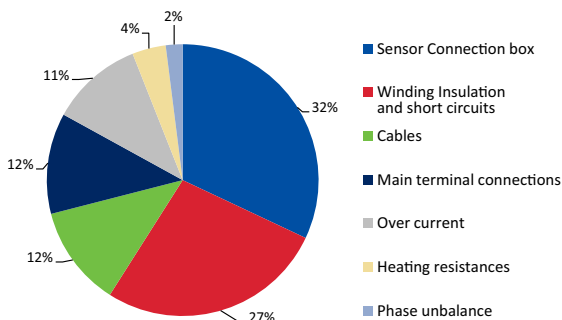
Motors and Generators are key assets in most utility and industrial applications. Studies from the IEEE and EPRI (Electric Power Research Institute) show that up to 37% of forced outages are caused by failures in the stator insulation system.



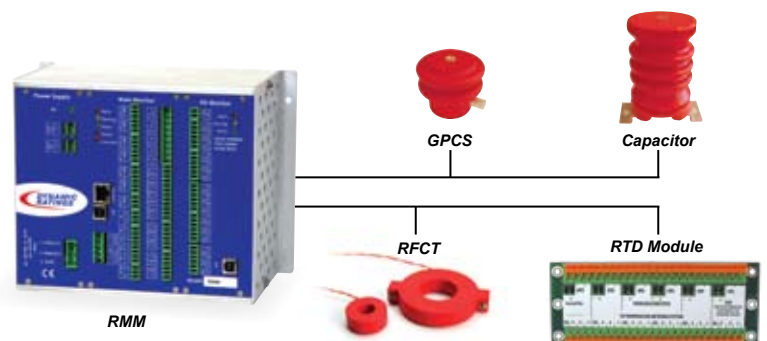
RMM monitors Turbos, Motors and Hydros

Motor Failures

Source: CIGRE Motor Failure Survey WG A1.19



Compatible with Partial Discharge Sensors





Software Package

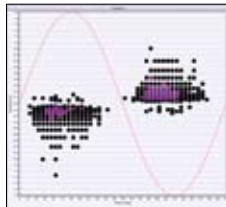
The supplied application software is intended to run on PC's with Microsoft Windows™ software. Our RMM application software is a versatile product supporting Dynamic Ratings portable and continuous insulation monitoring systems that may be found on generators, motors, switchgear, cables, bus duct, and transformers. The software allows the user to configure the instrumentation, download and store the data and provides tools for data presentation and analysis.



Graphic Results

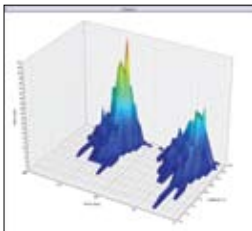
Test results can be presented in all industry accepted formats:

- 2D Phase Resolved
- 3D Phase Resolved
- Polar Phase Resolved
- Trend
- Pulse Height Distribution

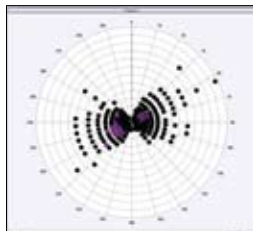


2D Phase Resolved

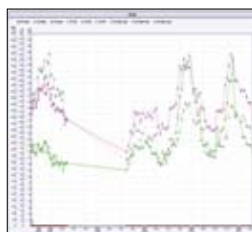
The software allows for the trending of all standard quantities of magnitudes, pulse counts, PD Intensity as well as operating dynamics. Multiple channels can be presented on the same screen for easy comparison and analysis.



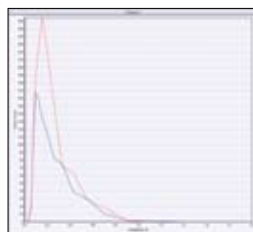
3D Phase Resolved



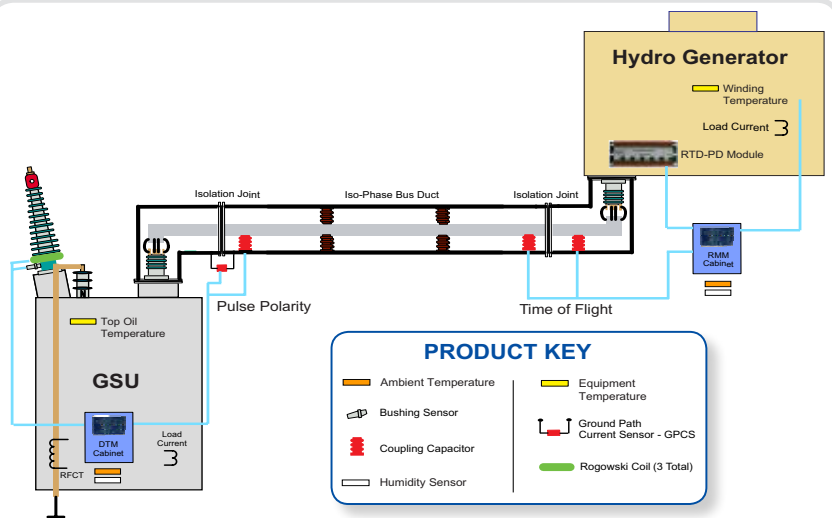
Polar Phase Resolved



Trend



Pulse Height Distribution



CASE STUDY

Customer Avoids Costly Generator Rewind & Extends Asset Useful Life

A West Coast Hydro producer has been performing Partial Discharge measurements on a periodic basis for over 10 years. Their measuring equipment and technology had become obsolete. During their quest to upgrade their technology, it was decided to go with a cost effective continuous monitoring system from Dynamic Ratings.

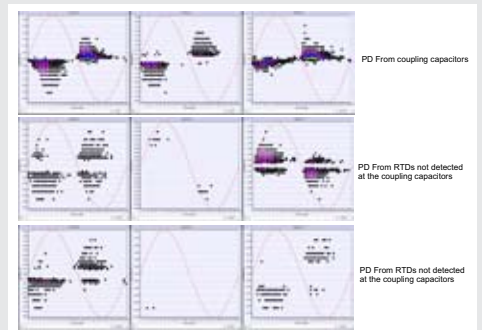
The cost of implementing continuous PD monitoring on two generators was less than purchasing a new portable analyzer. Savings were achieved by utilizing the existing coupling capacitors from another vendor. Their original investment was not lost.

Since the coupling capacitors alone only provide 10-15% winding coverage, the system was upgraded to reuse six existing RTDs as additional PD sensors, thus expanding the coverage. The RMM is now detecting PD that is occurring deeper in the winding, which was not being detected previously.

Using both of these complementary sensors, the customer is receiving more information—therefore making better decisions as to the health of the equipment.

In conjunction with monitoring the generators, the customer decided to monitor the Isolated Phase Bus Duct and the Generator Step-up Transformer (GSU) by installing the Dynamic Ratings Diagnostic Transformer Monitor (DTM).

This complete system monitors the generator, bus duct, and transformer. The customer has further reduced their off-line maintenance costs for these critical assets.



SPECIFICATIONS

PD Channels:	15 channels per module with concurrent data acquisition
Dynamic Range:	70 dB, 3 mV to 10 V, with no gain adjustment
Power Frequency Phase Resolution:	7.5°
Power Requirement:	90 - 264 VAC line voltage (47 to 63Hz), 100 to 300 VDC
Internal Memory:	8 MB
Magnitude Windows:	32
Measurement Frequency Bandwidth:	1 MHz to 20 MHz
Temperature Range:	- 40° C to 70° C / - 40° F to 158° F
User Interface:	PC

RMM — ORDERING INFORMATION

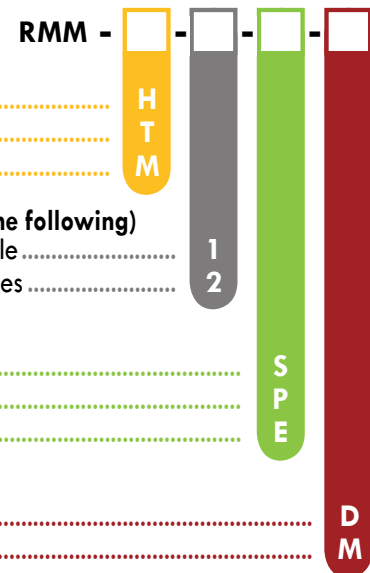
Base System¹

Base System: H, T, or M (select one of the following)

H = Hydro Generator, Monitor

T = Turbo Generator, Monitor

M = Motor Monitor



Optional Modules

Partial Discharge (PD) Optional Modules 1 or 2 (select one of the following)

1 = (One), 15 Channel Partial Discharge (PD) Monitoring Module

2 = (Two), 15 Channel Partial Discharge (PD) Monitoring Modules

Packaging Options^{2,3,4}

Packaging Options: S, P, or E (select one of the following)

S = Stand-alone Monitor

P = Panel^{2,4} Mounted Monitor

E = Monitor is Mounted in a NEMA 4x Enclosure^{3,4}

Communication Protocols

Communication Options: D or M (select one of the following)

D = DNP 3.0 Communications

M = Modbus Communications

Notes

¹ All base systems include (1) AuxCT current transformer, (1) AmbH ambient humidity sensor and (1) AmbT ambient temperature sensor.

² Panel size may vary to accommodate base system selection. Consult the factory with questions.

³ Enclosure size may vary to accommodate base system options and enclosure type.

⁴ Packaging options P and E include the monitor mounted with all terminals wired out to terminal blocks.



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SENSORS and ACCESSORIES

The products above are compatible with industry sensors, including Dynamic Ratings; Coupling Capacitors, RTD-PD Sensing Module, Ground Path Current Sensor and Radio-Frequency Current Transformer Sensors.

Contact us for a “Sensors & Accessories for Partial Discharge (PD) Monitoring Systems” product catalog.



Contact your sales representative for application assistance or pricing.

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