

# Condition Monitoring Matters with LIFEVIEW®

Enhancing Partial Discharge Detection Using Bandpass Filtering



Using Quartzteq's LIFEVIEW® online condition monitoring systems, this insight explores how frequency-selective bandpass filtering can improve partial discharge (PD) detection in high-voltage rotating machines.

By enabling measurements to be tailored across different frequency bands to suit specific machines and operating conditions, LIFEVIEW helps distinguish true PD activity from electrical noise, improving diagnostic clarity and confidence.

## Measurement Barriers

Partial discharge signals are often hidden beneath broadband noise from power electronics, switching devices, and environmental interference. In conventional wideband measurements, this noise can easily mask true PD activity, making it difficult to detect insulation defects and reducing confidence in diagnostics.

LIFEVIEW measures PD in accordance with IEC 60270 and IEC 60034-27-2, using sensors designed for high PD sensitivity to more clearly separate true discharge activity from background electrical noise.

## Why Frequency Matters

Different PD sources emit energy across a broad frequency spectrum, but their activity often tends to be more pronounced in certain frequency ranges:

- Surface PD → mid-frequency ranges
- Corona discharge → lower frequencies

By tuning the measurement band, specific PD mechanisms are enhanced while unrelated noise is suppressed. Frequency-selective measurement ensures that hidden PD activity becomes visible and diagnostic confidence increases.

# Measurement Strategy

During assessments, multiple frequency bands were evaluated using LIFEVIEW's selectable bandpass filters. Noise-dominated bands were excluded, and PD measurements were repeated in optimised ranges. The ability to switch easily between bands allowed comparison of signal-to-noise ratios (SNR) across the spectrum.



# Results

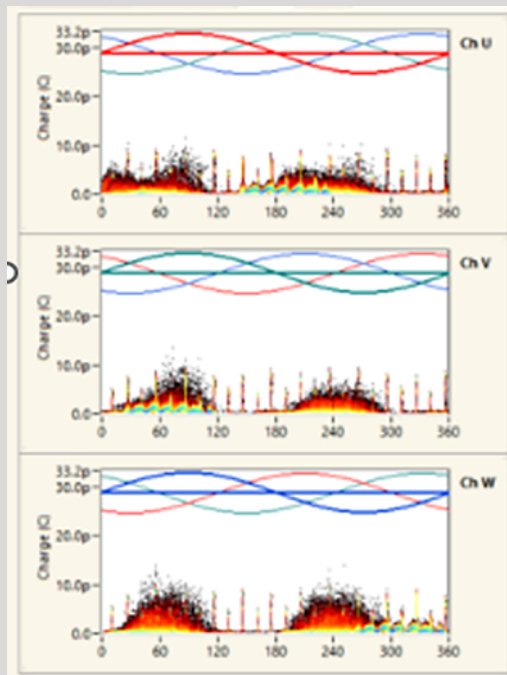
Key observations include:

- Clear separation of PD pulses from background noise
- Reduction of excitation-system interference by shifting from low-frequency (0.1–1 MHz) to higher-frequency (0.5–10 MHz) bands
- Improved clarity of PRPD patterns
- Detection of PD activity obscured in wideband measurements
- Identification of bar-to-bar and bar-to-earth discharge patterns

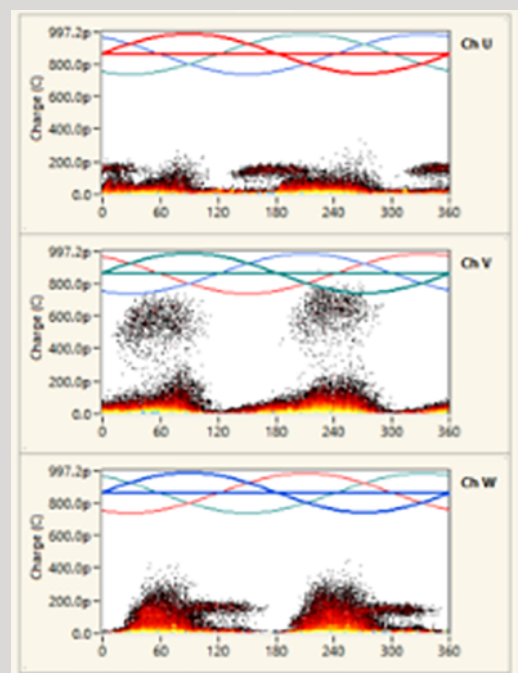
By switching to 0.5-10Mhz range we saw a 24% increase in maximum PD pulse repetition, giving higher resolution patterns.

Illustrations of PRPD plots show that low-frequency measurements are dominated by periodic noise, while higher-frequency measurements suppress noise and reveal well-defined patterns associated with bar-to-bar and bar-to-earth patterns. These observations highlight the frequency-dependent nature of PD phenomena and the importance of selecting the correct measurement band.

PRPD with noise (0.1 - 1 MHz)



PRPD without noise (0.5 - 10 MHz)



**Using LIFEVIEW, frequency-selective measurement filters out noise, reveals previously hidden PD activity, and improves diagnostic accuracy and asset condition assessment. By enabling flexible, band-specific monitoring, LIFEVIEW provides a reliable and insightful approach to PD diagnostics in real-world, noisy environments.**