PTSUSPD Intelligent Ultra Sonic PD Sensor

Product Overview

The PTSUSPD™ Intelligent Ultrasonic Partial Discharge Sensor is Power Technologies' advanced solution for detecting and analyzing partial discharge (PD) activity in medium-voltage (MV) and high-voltage (HV) switchgear. Utilizing ultrasonic detection methods, the sensor provides accurate surface-level measurement of PD signals, enabling operators to identify, localize, and assess discharge activity along metallic switchgear enclosures. By delivering actionable insights into asset condition, the PTSUSPD™ supports enhanced system reliability, operational safety, and predictive maintenance strategies.

Engineered with a magnetic mounting interface for secure attachment, the sensor ensures stable measurements in demanding environments. Its dual operating modes—Amplitude Detection and Time-Domain Waveform Analysis—offer both quick signal characterization and detailed diagnostic evaluation, making it an indispensable tool for switchgear monitoring and condition assessment.

Operating Principle

When partial discharge occurs within medium- or high-voltage equipment, the resulting acoustic energy propagates through the metallic enclosure. The PTSUSPD™ detects these ultrasonic emissions and converts them into proportional electrical signals. These signals are then transmitted to a data acquisition system, where they are analyzed to determine both the presence and the intensity of partial discharge activity. By translating ultrasonic energy into actionable diagnostic information, the PTSUSPD™ enables reliable monitoring of insulation health and supports proactive maintenance strategies.

Key Features & Functionality

- Ultrasonic PD Detection: Captures sound waves from partial discharges and converts them into electrical signals for precise analysis.
- Miniaturized & Magnetic Design: Compact sensor with magnetic mounting for easy installation on inner or outer switchgear surfaces, typically near cable terminations.
- High Sensitivity at 40 kHz: Utilizes a 40 kHz center-frequency air ultrasonic sensor with a piezoelectric crystal for accurate sound-to-electric conversion.
- Electromagnetic Immunity: Ultrasonic testing is inherently resistant to electromagnetic interference, ensuring reliable measurements in HV environments.
- Condition-Based Monitoring: Enables early PD detection, supporting proactive maintenance and reducing insulation failure risk.

Characteristics

The PTSUSPD™ is purpose-built for partial discharge detection in MV and HV switchgear, offering precise monitoring of discharge activity along inner metallic surfaces of equipment enclosures. Its ability to localize PD sources through ultrasonic signal analysis ensures targeted diagnostics and effective maintenance planning. A magnetic mounting interface provides secure and stable attachment to switchgear surfaces, enabling consistent measurements even in demanding environments.

The sensor features two complementary operating modes: Amplitude Detection Mode, which delivers RMS values, peak amplitude, and frequency-domain characteristics for quick signal characterization; and Time-Domain Waveform Mode, which presents raw ultrasonic waveforms for detailed analysis and diagnostic evaluation. Together, these capabilities make the PTSUSPD™ a reliable, versatile tool for improving asset health monitoring, reducing downtime, and strengthening operational safety.

Performance Considerations

- Free particle collisions inside switchgear may introduce additional acoustic noise.
- Discharges deep within complex insulation structures may be attenuated and harder to detect.
- Effective detection requires ultrasonic emissions to propagate through air.
- PD in fully sealed, air-tight HV equipment without air gaps may not be detectable.

Ultrasonic PD detection is only effective when discharge-generated ultrasonic signals can travel unobstructed through air. In fully enclosed high-voltage equipment with no internal air gaps, internal PD activity may not be detectable using ultrasonic methods.

Specifications

Detection Type	Ultrasonic Airborne Acoustic
Bandwidth	20 kHz ~ 200 kHz
Peak Sensitivity	60 dB [V/(m/s)]
Detection Sensitivity	40 dB [V/(m/s)]
Linear Error	± 20%
Sampling Rate	100 MS/s
Amplitude Deviation for Different Detection Channels	± 10%
Time Deviation for Different Detection Channels	± 5 µs
Measurement Range	-7~ 68 dBµV
Centre Frequency	40 kHz (±2 kHz)
Output Connector	Aerial Plug / BNC / SMA

Ultrasonic Sensor Partial Discharge	20 pC (minimum detection)
Input Impedance	50 Ω
Miscellaneous	
Dimensions Size	Casing: W35 x D41.5 x H82 Sensor: D20.5 x Ø18
Weight	Casing: 260g; Sensor: 20g
Ordering Information	
Part Number	Product Description
PTSUSPD	PTSenR™ Intelligent Ultra Sonic PD Sensor