

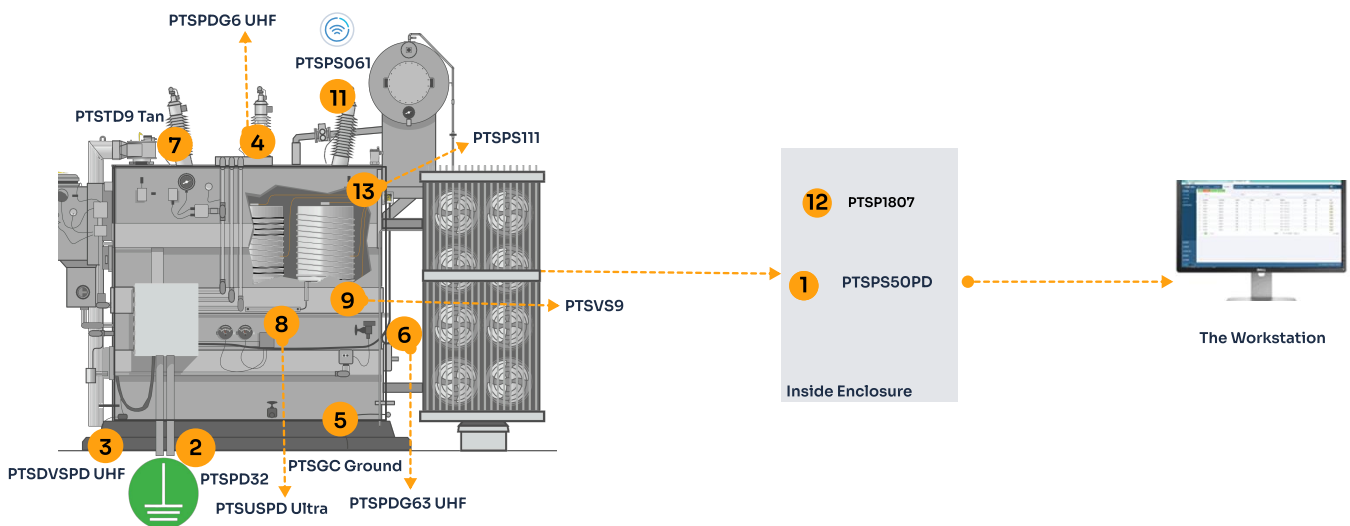
PTSPTX Power Transformer AI Partial Discharge Monitoring Solutions

Product Overview

The PTSenR™ PTSPTX Power Transformer AI Partial Discharge Monitoring Solutions is an advanced online monitoring solution designed to ensure the safe, reliable operation of power transformers by continuously detecting Partial Discharge (PD) activity. Utilizing cutting-edge sensor arrays including UHF, HFCT, ultrasonic, voice-print vibration, temperature sensors, and infrared imaging it identifies insulation anomalies in real time. Suitable for all transformer types (110 kV to 765 kV), this system offers customizable sensor integration and a user-friendly, web-based HMI for distributed site monitoring.

Leveraging AI-powered algorithms with deep learning, PTSPTX enhances PD detection accuracy, performs comprehensive spectral and risk analyses, and provides actionable recommendations to mitigate fault conditions proactively. By offering detailed trend insights, automated diagnostics, and multi-transformer monitoring capability, PTSPTX extends asset lifespan, minimizes operational downtime, and optimizes maintenance strategies.

System Architecture



Why Monitor Partial Discharge?

- **Preventive Maintenance:** PD activity signals insulation stress that could lead to faults and catastrophic failure.
- **Diagnostic Standard:** PD measurement is globally recognized for HV asset diagnostics during type, routine, and on-site testing.
- **Complex Signal Recognition:** Advanced techniques like UHF and noise suppression ensure reliable signal isolation.
- **Early Warning:** Detects negative insulation trends early, enabling timely corrective actions and prolonging transformer health.



Characteristics

- Real-time Detection: Monitors abnormal activities using an array of sensors including UHF, HFCT, ultrasonic, infrared, and vibration signatures.
- Broad Compatibility: Applicable to transformers rated from 110 kV up to 765 kV.
- Simultaneous Bushing & Tank Monitoring: Detects PD in bushings and inside the main tank concurrently.
- Customizable Integration: Sensor dimensions are adaptable to various transformer designs and installation constraints.
- Web-based Interface: Provides remote access to real-time PD data, configuration settings, historical trend analysis, and report generation.
- Multi-Transformer Monitoring: Supports simultaneous supervision of up to 8 transformers per substation.
- AI Deep Learning Analysis: Differentiates genuine PD signals from ambient noise with high precision using a neural network.
- IEC 61850 Compliant: Smart substation-ready for seamless integration into digital infrastructure.

Benefits to Utilities & Operators

- Extend transformer lifespan and reduce asset failures
- Avoid costly outages through predictive fault recognition
- Optimize O&M schedules with accurate health insights
- Reduce installation time and site disruption
- Enhance ROI with multi-transformer visibility at one glance

Specifications

1. PTSPS50PD PTSenR Power Transformer AI DAU

Monitoring Channel	4 ~ 32 Channels
Power Input	AC 120 V ~ 240 V
Sampling Rate	100 Mbs
Power Consumption	< 30 W
Operating Humidity	< 95%
Self-test Function	It has a boot self-test and automatic system recovery
Operation Temperature	-25°C ~ +65°C
Synchronously Scan Channels	All Channels
Sampling Accuracy	12 bits
Refresh Rate	≤1 second
Discharge Type Identification	More than 5 typical discharge types
Monitoring Content	Discharge Amplitude (Q), Phase (Φ), Frequency (N), Discharge Rate
PD Fault Location	Yes
Synchronization Signal	Power Supply or Other
Noise Cancellation Ability	Very Strong
Over-voltage Protection	Yes
Signal Input Interface	N-type RF Terminal
Communication Interface	RJ45, fibre SC or ST
Cabinet Form	Small outdoor vertical cabinet type 304 stainless steel, exterior spraying
Design Life	> 20 years
Applicable Voltage Level	Full Voltage Level
Extended Performance	Maximum access to 1,000 points, using distributed networking
EMC shielding	Yes



PTSPS50PD

2. PTSPD32 PTSenR Intelligent HFCT PD Sensor

Operation Temperature & RH	-45°C ~ +80°C; < 95%
PD Measurement Frequency	3 MHz~30 MHz
Average Transmission Impedance	10 mV/mA
Minimum Measurable Partial Discharge	50 pC
Dynamic Range	40 dB
Linearity Error	±15%
Suppression Of Narrowband Interference Signals	20 dB
Sampling Rate	100 MS/s
Time Deviation For Different Detection Channels	2 us
Aperture	54 mm (customizable)
Installation Method	Clamp-On (Open type)



PTSPD32

3. PTSDVSPD PTSenR Intelligent UHF Oil Valve Sensor

4. PTSPDG63 PTSenR Intelligent UHF Busing Window Sensor

Operating Temperature	-25°C ~ +65°C
Operating Humidity	< 95%
Type	Built-in/External
Measurement Sensitivity	-80 dBm
Measurement Bandwidth	300 MHz ~ 1500 MHz
Measurement Accuracy	0.1 dBm
Average Equivalent Height	>12 mm
Over-Voltage Protection	Yes
Signal Interface	N-type RF Terminal
Material	6061 Aluminium Alloy/304 Stainless Steel
Water Resistance	Good
Design Life	> 50 years
Applicable Voltage Level	Full Voltage Level



PTSDVSPD



PTSPDG63

5. PTSGC PTSenR Intelligent Core Ground Current Sensor

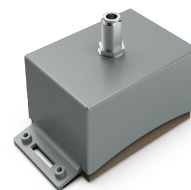
Sensitivity	0.1 mA
Measurement Range	2 mA~10 A
Full-Scale Linear Error	5 mA~100 mA: ±2.5 mA; 100 mA~10 A: 2.5%



PTSGC

6. PTSPDG6 PTSenR Intelligent UHF Spacer PD Sensor

Measurement Sensitivity	-80 dBm
Detection Bandwidth	300 MHz ~ 1500 MHz
Material	Stainless steel
Connector Type	N-Type



PTSPDG6

7. PTSTD9 PTSenR Intelligent Tan Delta Bushing Leakage Current PD Sensor

Dielectric Loss Measurement Range	-100% - 100%
Measurement Error Of Media Loss	± (standard reading× 1% + 0.0005)
Capacitance Measurement Range	100~50000 pF
Capacitance Measurement Error	± (standard reading× 1%+1pF)
Storage Temperature	-20°C~55°C, relative humidity; ≤ 85% RH, no corrosive gas
Working Humidity	5~95% RH relative humidity non-condensing
Power Supply	AC 220 V
Communication Interface	aviation plug (sensor end)
Communication Protocol	TCP protocol
Protection Level	IP 68
Service Life	>10 years



PTSTD9

8. PTSUSPD PTSenR Intelligent Ultra Sonic PD Sensor

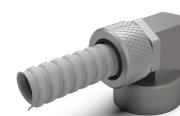
Sensor Peak Sensitivity	60 dB (V/(m/s))
Mean Sensitivity	40 dB (V/(m/s))
Detection Sensitivity	40 dB
Frequency Band Range	20 KHz~200 KHz
Dynamic range	40 dB
Linear error	± 20%
Sampling rate	100 MS/s
Amplitude deviation for different detection channels	±10%
Time deviation for different detection channels	±5 μs
Input impedance	50 Ω



PTSUSPD

9. PTSVS9 PTSenR Intelligent Vibration Sensor

Measuring Range (Peak to Peak)	0.1 μm ~ 400 μm
Vibration Acceleration	-10 g ~ +10 g
Sensor Sensitivity	100 mV/g
Frequency Response	End of 3000 Hz (+/- 5%)



PTSVS9

10. PTSPDRF PTSenR Intelligent Noise Sensor

Detection Frequency Band Range 100 MHz~1000 MHz

Average Effective Height ≥ 10 mm

Sampling Rate 100 MS/s

PC

Operating System (OS) Microsoft Windows

Specification Regular

VizionEye AI Software Partial Discharge System Software

Measuring Mode Real time, Event, Trend

Display Real time data display (PRPD / PRPS / 2D / 3D)
Event data display (PRPD / PRPS / 2D / 3D)
Trend data graph (daily / weekly / monthly)

Expert PD Analysis Programmable alarm criteria
Warning of PD activity
Automatic communication of warning/alarm condition
Report generation (daily/weekly/monthly)
Data stored on local or could



PTSPDRF

The PTSPTX system is modular and site-adaptable, featuring:

- 11. PTSPS061:** The PTSPS061 Self Powered Energy Harvesting Wireless Temperature Sensor offers battery-free, wireless protocol communication for reliable, isolated temperature monitoring in high-voltage switchgear. With 20 years of technical refinement, it delivers exceptional stability, compact design, and zero-maintenance performance across global industrial applications.
- 12. PTSP1807:** The PTSP1807 Wireless Communication Gateway enables efficient, low-power data transmission across RS485, fiber, and Ethernet interfaces. Its high integration and signal conversion capabilities ensure real-time industrial monitoring with superior reliability and interference resistance.
- 13. PTSPS111:** The PTSPS111 Wireless Battery Temperature Sensor combines efficiency and reliability, powered by a high-capacity lithium battery that ensures extended operational life. It is designed to function across a broad temperature range, ensuring accurate measurements even in extreme conditions. The sensor uses direct contact-type temperature measurement for high precision and consistency, transmitting real-time data through the Wireless Protocol. This protocol offers robust performance with strong resistance to interference, ensuring reliable data transmission over long distances.



Additional accessories include vibration sensors and expandable integration with external diagnostic equipment.

VizionEye AI Diagnostic Software Suite

VizionEye™ windows-based software enables full configuration of instrumentation, automated data downloads, historical analysis, and visual insight tools. Designed for switchgear, cables, and transformers, it supports intuitive PD signal interpretation and real-time fault classification making it a versatile solution for continuous insulation health management.

The comprehensive transformer health diagnosis software provides real-time visualization of all acquired signals, enabling precise monitoring and analysis of partial discharge (PD) events. Key parameters such as

amplitude (Q), phase angle (Φ), and discharge count (N) are captured and rendered across multiple diagnostic maps, including:

- 3D Φ -Q-N Map for spatial discharge profiling
- 2D N-Q, Q-t, N-t Maps for temporal and intensity analysis
- Qmax- Φ and Qavr- Φ Maps for peak and average discharge correlation
- Ellipse Plot for discharge pattern recognition
- 3D Φ -Q-t Grayscale Map for dynamic discharge evolution tracking

Advanced Fault Identification: A built-in vector machine tool enables intelligent classification of discharge types, supports fault prediction alarms, and provides statistical insights into fault development trends.

Protocol Compatibility & Data Integration: The expert diagnostic software is fully compliant with IEC 61850 and DL/T 860 communication standards, ensuring seamless upload of PD analysis data and results to centralized systems.

Distributed Cloud Architecture: Each Intelligent Electronic Device (IED) host is networked via optical fiber, transmitting data to a centralized expert diagnostic system housed in the backend screen cabinet. This distributed cloud computing model ensures scalable, high-speed data processing.

Modular & Extensible Configuration: Developed using flexible configuration software, the system easily integrates additional online monitoring modules, including:

- Core Ground Current Monitoring
- Oil Chromatography Analysis
- Other Condition-Based Data Streams

Partial Discharge Analysis

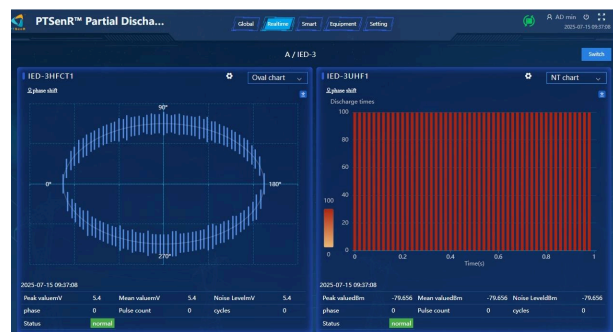
- PD trending and pps (pulse-per-second) metrics
- PRPD and PRPS pattern recognition
- Spectrum-based diagnostics
- Deep learning-driven instant analysis
- Failure mechanism recommendations
- Comprehensive risk assessment

Reporting Features

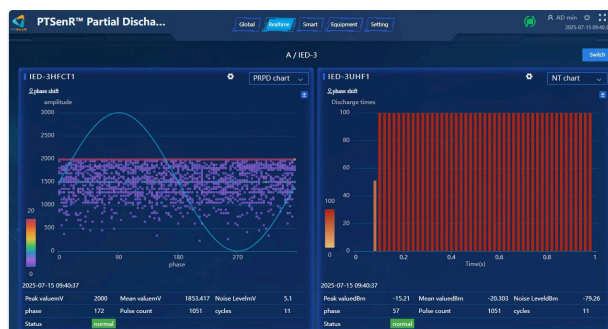
- Periodic reports with operational statistics and diagnostics
- Event-based reporting with visual patterns and risk forecasts
- Cloud-enabled data synchronization and access



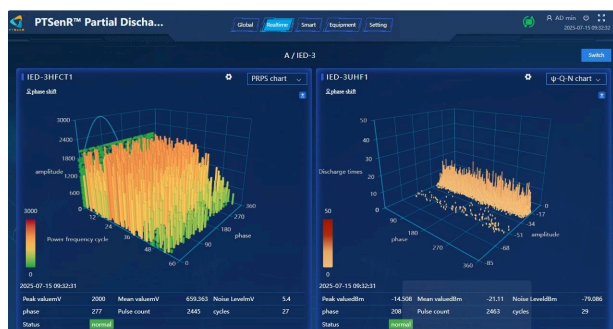
Discharge Rate & QT Chart



Oval & NT Chart



PRPD & NT Chart



PRPS & Q-N & chart

Installed Sensors



Installation diagram of the built-in UHF partial amp sensor on the transformer housing



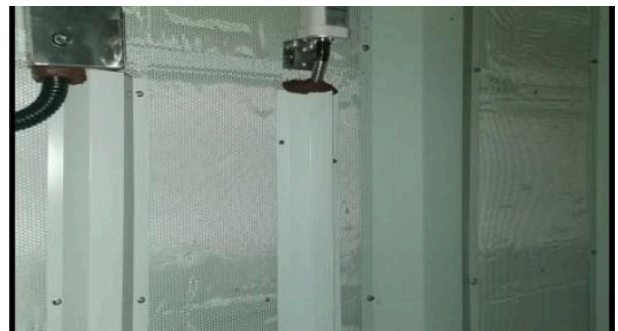
Field installation diagram of transformer oil valve type UHF sensor Field installation diagram of transformer external UHF sensor



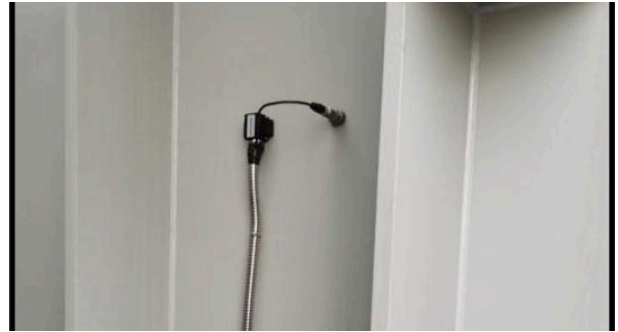
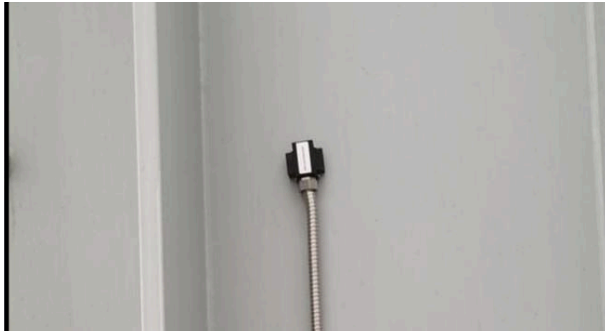
On-site installation diagram of high-frequency partial discharge sensor



On-site installation diagram of transformer end-screen sensor



Field installation drawing of transformer core/clamp grounding current sensor Transformer RF sensor on-site installation drawing



Transformer ultrasonic sensor on-site installation diagram
Transformer vibration sensor on-site installation diagram

Applications

Power Plants



Utilities Stations



Data Centers

