WINTECH® 成浩科電股份有限公司

THE POWER OF LIFE

WinTech® Partial Discharge based “Predictive Intelligence” of insulation system to eliminate power failure risk.

About Us

The flaw of dielectric material under strong electric field caused partial discharge was well known for decades and believed as the initial and important sign of insulation deteriorated for the electrical equipment.

Due to the weakness of partial discharge signal and highly interfered by environmental noises, result in difficult to identify partial discharge signal correctly. Therefore, the international standards for the measurement of partial discharge (IEC 60270), can't measure and use in field application, but only apply in the enclosed condition, like a lab for factory of manufacturing electrical equipment.

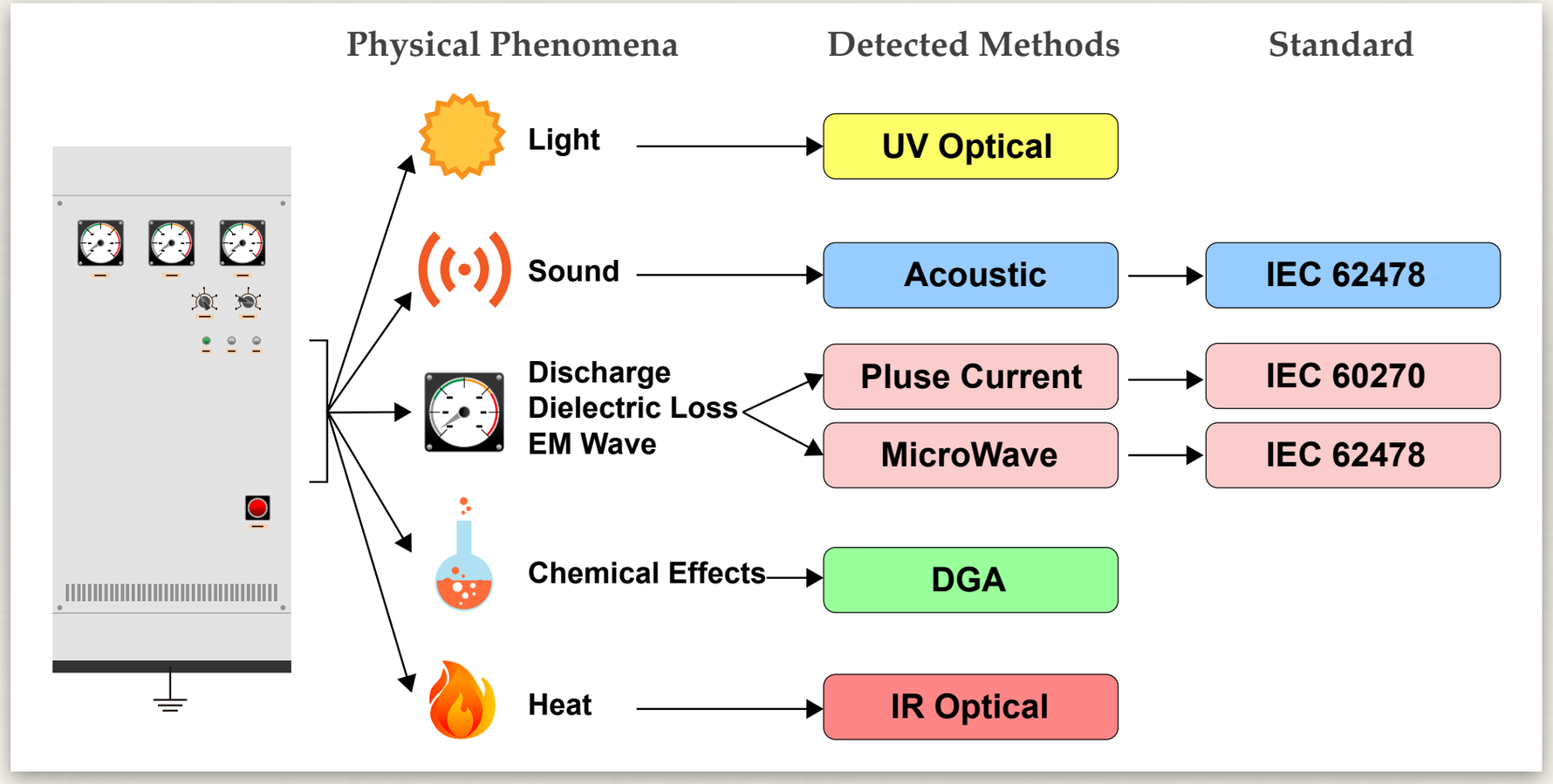
In view of the importance and difficulty of partial discharge detection, WinTech® gathered experts from domestic and foreign, collaborated famous universities worldwide, developed a series of precise sensors which are non-invasive for various electrical equipment accordingly; such as ultrasonic-sensors, transient-voltage sensors, high-frequency and ultra-high frequency current sensor and other sensors, set up the Partial Discharge laboratory focusing on the research of capturing signal by band, identifying partial discharging signal effectively via specific analysis software, successfully established monitoring and testing techniques and built up the products of detecting and analysis system of Partial Discharge then achieved effectively identifying the characteristics of PD activity of the insulation system, and thereby to upgrade the operation safety and reliability of power system.

Introduction of partial discharge

- Partial discharges (PDs) are electric discharges that occur inside the insulation material of high voltage (HV) apparatus due to the presence of voids, impurities, or cracks resulting from failures on the manufacturing process, mechanical stress, or insulation aging process. The PD, which only partially bridges the insulation between conductors, occurs repetitively in a small region, and thus is named partial discharge.
- Partial discharges appear as pulses having duration of about few nanoseconds, which leads to frequency range above 1GHz. PD destroys the local insulation structure resulting in insulation degradation and eventually, in the long-term, spreads through the whole insulation and causes breakdowns of HV apparatus. The breakdowns of HV apparatus are often sudden and catastrophic, and lead to both economical and safety heavy losses.
- It is known that PDs generate both physical phenomena and chemical changes within the dielectric material. Specifically, PD activity produces sound, light, heat, electromagnetic signals, and chemical reactions. Depending on the type of HV equipment, PD monitor system integrated specific sensors and techniques successfully detect the characteristics of PD activity, provide an 'early warning' of 'incipient' insulation faults and preventive measures should be taken, effectively minimize the failure and damages caused by the insulation breakdown of HV equipment.

WinTech® Partial Discharge based "Predictive Intelligence" of insulation system to eliminate power failure risk.

- ***What is Partial Discharge?***
  - In electrical engineering, Partial Discharge is a localized dielectric breakdown of a small portion of insulation system, where the electric field strength exceeds the breakdown point of the insulation material.



- *IEC 60270* :
  IEC Standard for impulse current measuring methods of PD
- *IEC 62478* :
  IEC Standard for on-line PD measuring methods

- However, protracted partial discharge can erode strength of insulation system and eventually lead to breakdown of insulation, causing equipment failures and affecting power quality.

- ***Why Partial Discharge message can eliminate the risk of power failure?***

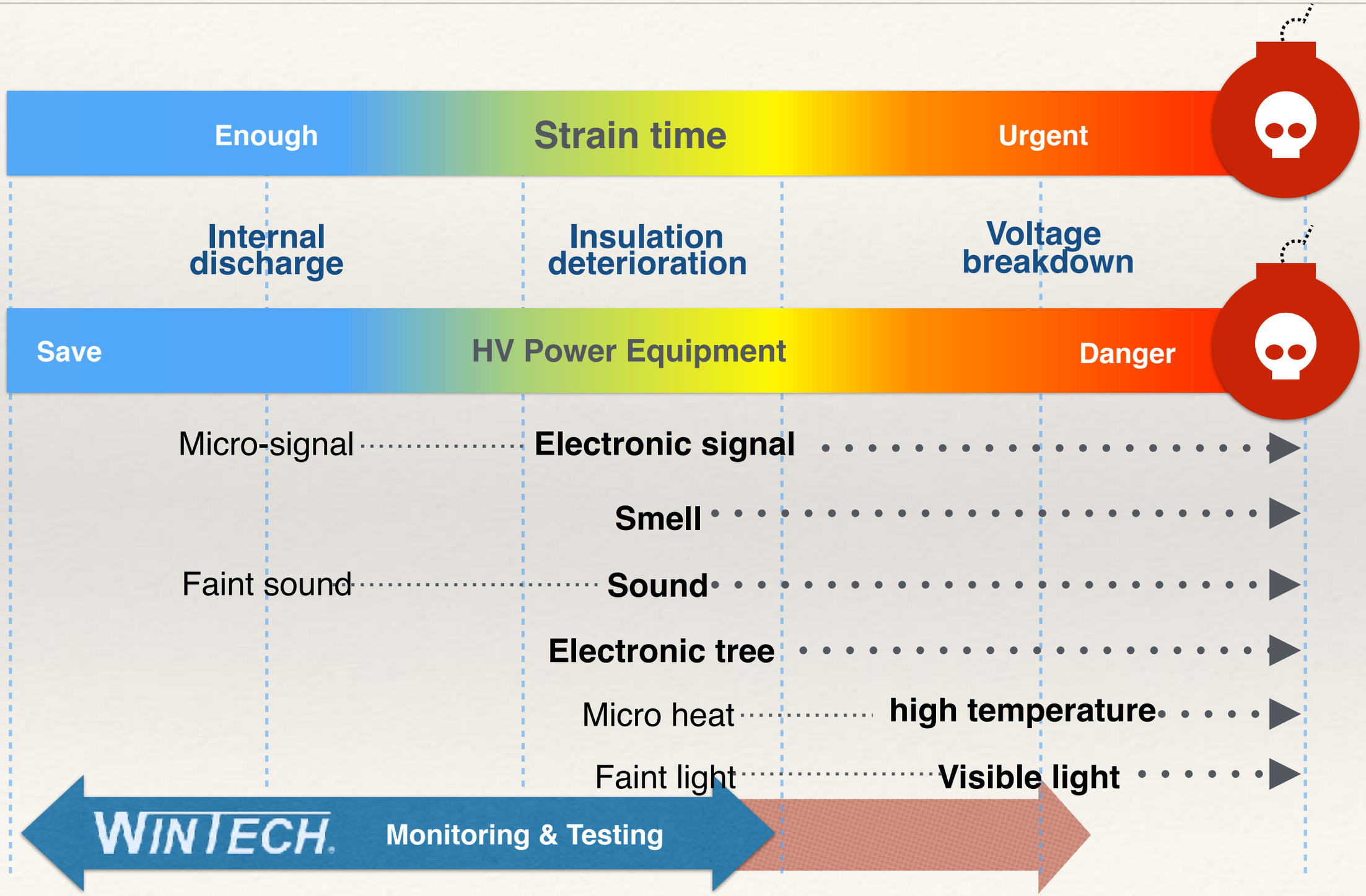
  Since to the Partial Discharge is the initial causes of insulation breakdown, an early detectable partial discharge data obviously is an effective message for developing predictable information to protecting the insulation system. In view of this, WinTech® set up the Partial Discharge laboratory focusing on the research of monitoring and testing techniques and building up the products of detecting and analysis system of Partial Discharge to establish the "Predictive Intelligence" of the insulation system and thereby to upgrade the safety and reliability of power system.

- ***Where are the Partial Discharge messages from and what are they?***
  - Whenever the partial discharge taken place, Partial Discharges will emit energy in the form as:
    - Electromagnetic emissions, in the form of radio waves, light and heat.
    - Acoustic emissions, in the audible and ultrasonic ranges.
    - Ozone and oxide of nitrogen gases.
    - Transient Current & Transient Earth Voltage (TEV) emissions.
  - Those various form of emissions can be detected and analyzed by specific sensors and associated analysis systems as:
    - Ultra High Frequency (UHF) Sensor.
    - High Frequency Current Transformer (HFCT) Sensor.
    - Ultrasonic Microphone Sensor.
    - Acoustic Contact Sensor.
    - TEV Sensor or coupling capacitor.
    - Phase-resolved analysis system to compare pulse timing to AC frequency.

- ***WinTech® "Predictive Intelligence" of insulation system.***
  - WinTech® has developed various sensors and adaptors as well as specific analysis system successfully established series of precise leading-edge Partial Discharge based "Predictive Intelligence" of the insulation system to cope with various power facilities maintenance and diagnostic demand.

WinTech® PD Application

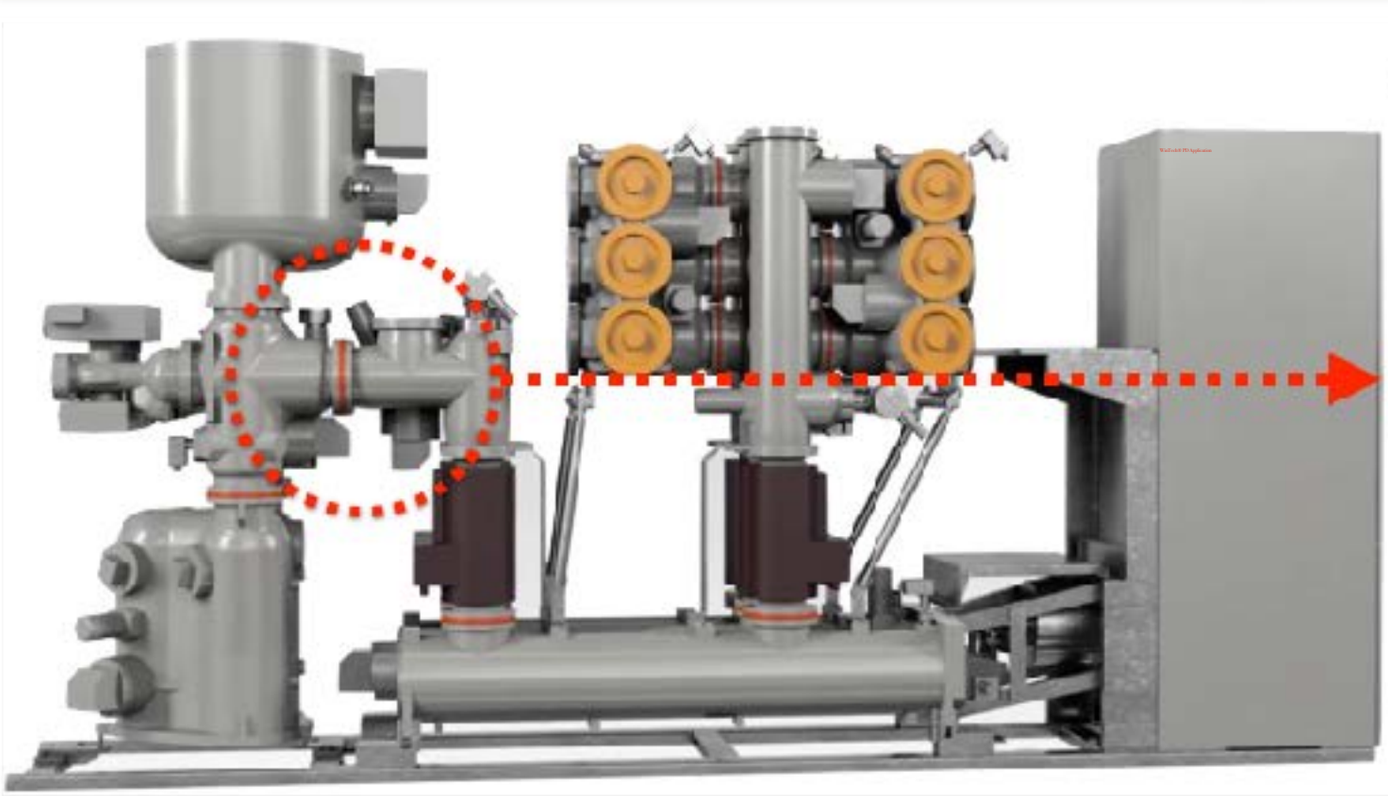
PD Multiple Physical Quantities Schematic

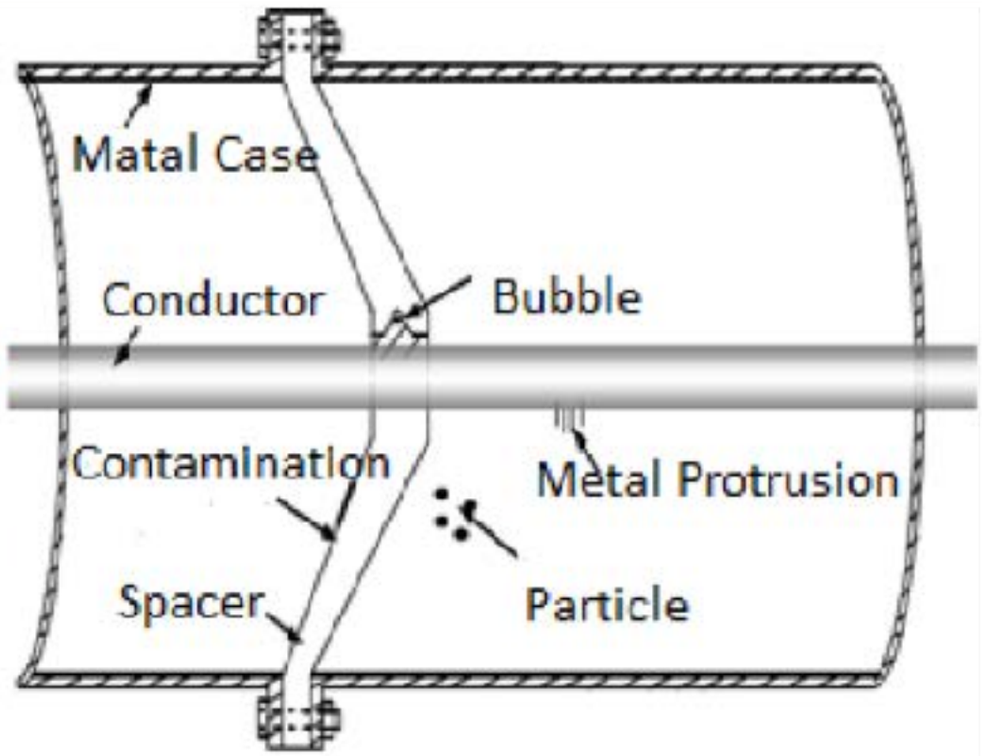


WinTech® PD Application

PD phenomenon of Gas Insulated Switchgear - Case

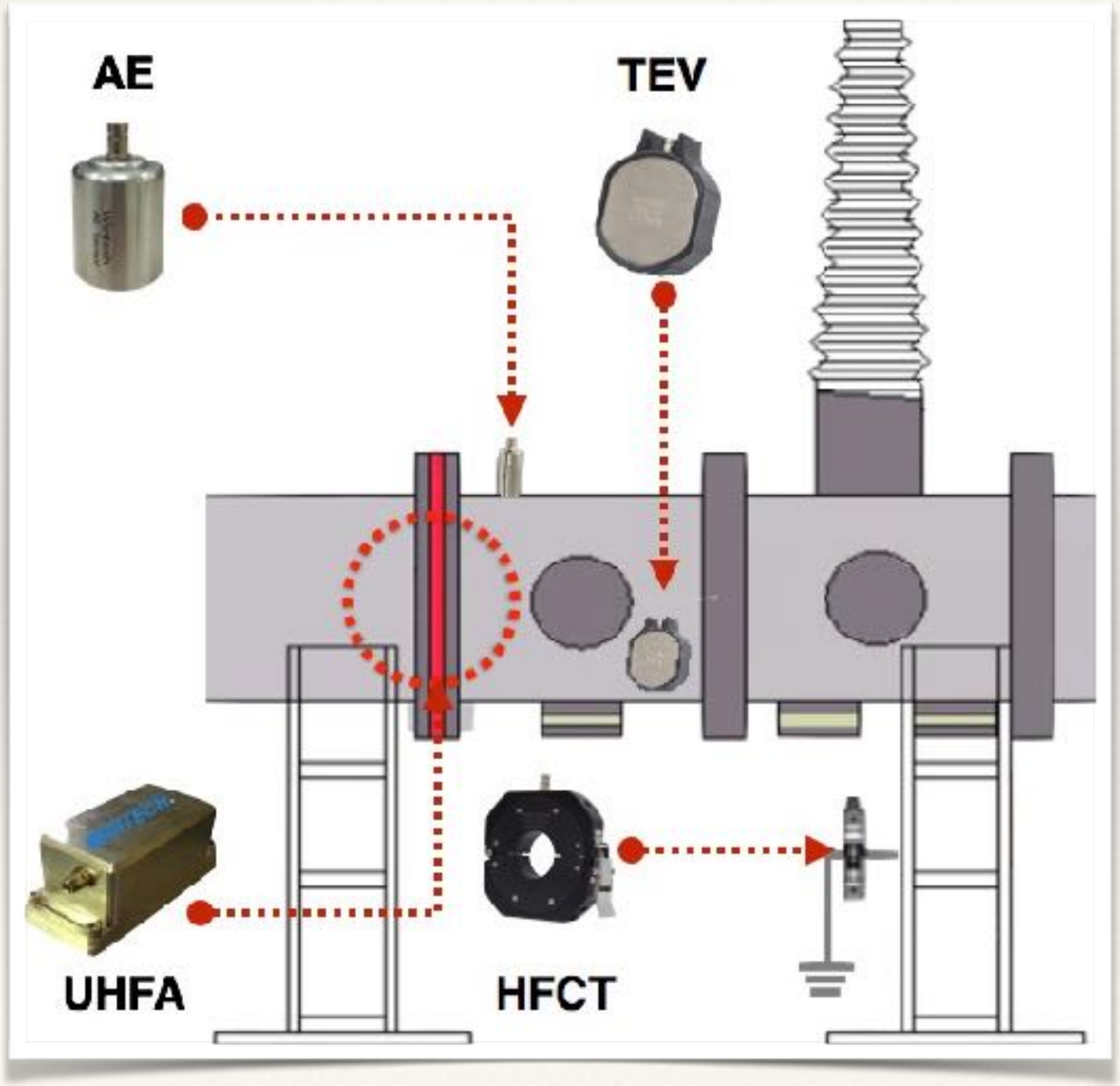
Metal particles and protrusion | Bubble and crack on spacer | Moisture in SF6





WinTech® PD Application

PD phenomenon of Gas Insulated Switchgear - Case



Sensors' Installation

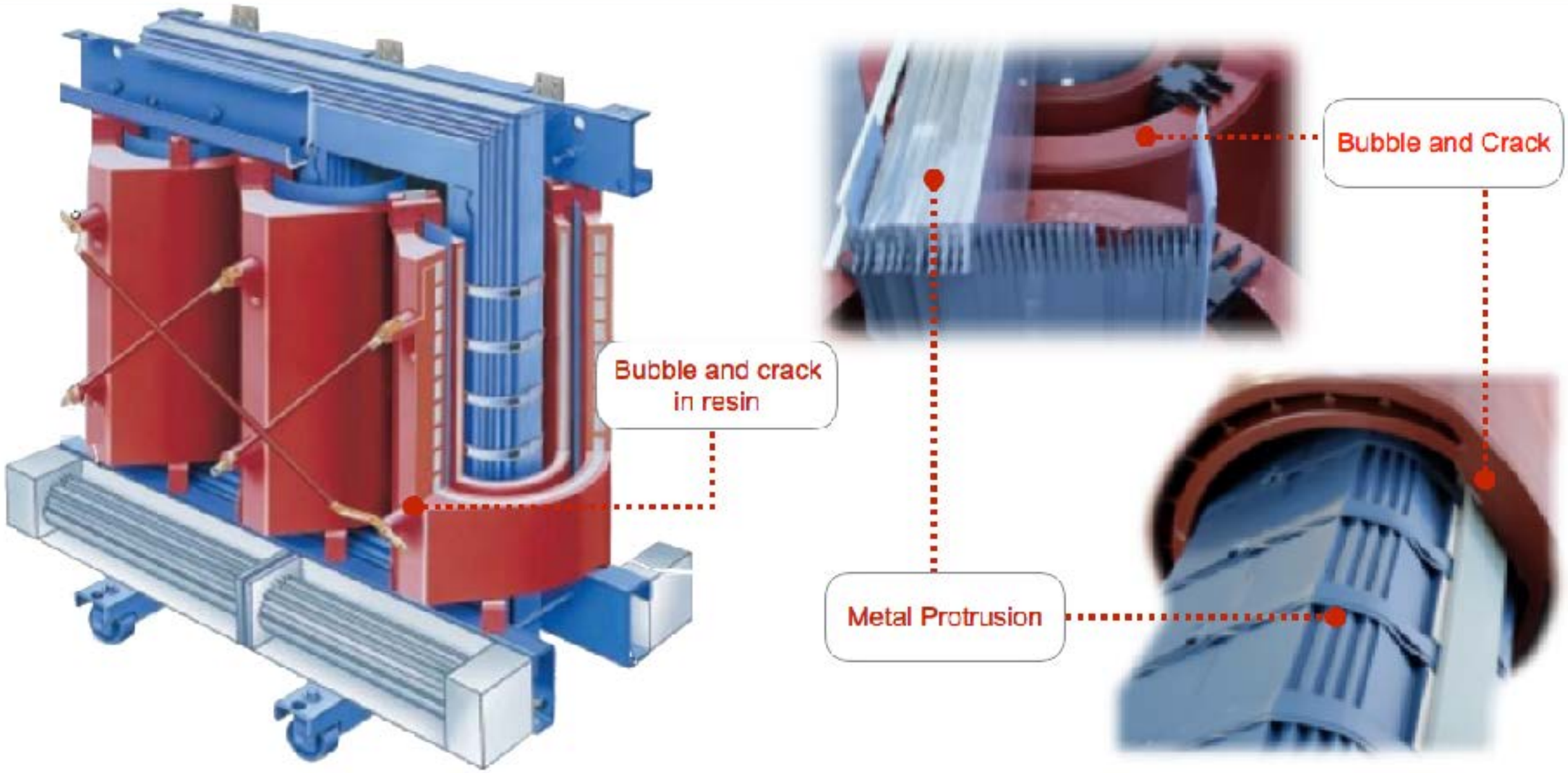
- Products and services：
  - Initial PD Monitor by PD Detector
  - Diagnostic PD Test by Wintech Power
  - Compatible sensors: AE, HFCT, TEV, UHF-GIS

- Suggested Instrument:
  - WINTECH POWER x 1
  - TEV Sensor x 1
  - HFCT Sensor x 1
  - AE Sensor x 1
  - UHF-GIS x 1

WinTech® PD Application

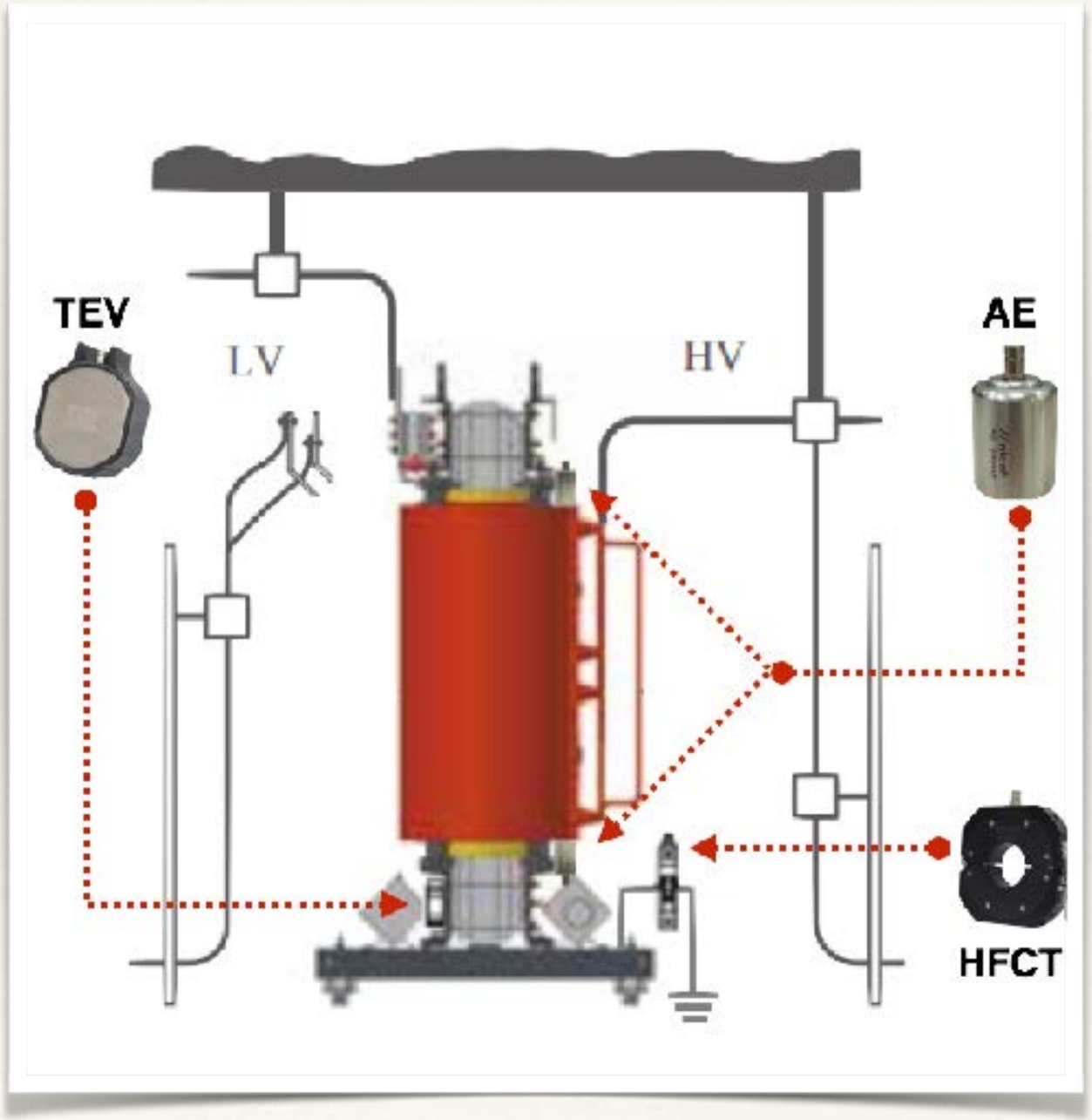
PD phenomenon of Cast-Resin Transformer - Case

Bubble and crack in resin | Metal protrusio



WinTech® PD Application

PD phenomenon of Cast-Resin Transformer - Case



Sensors' Installation

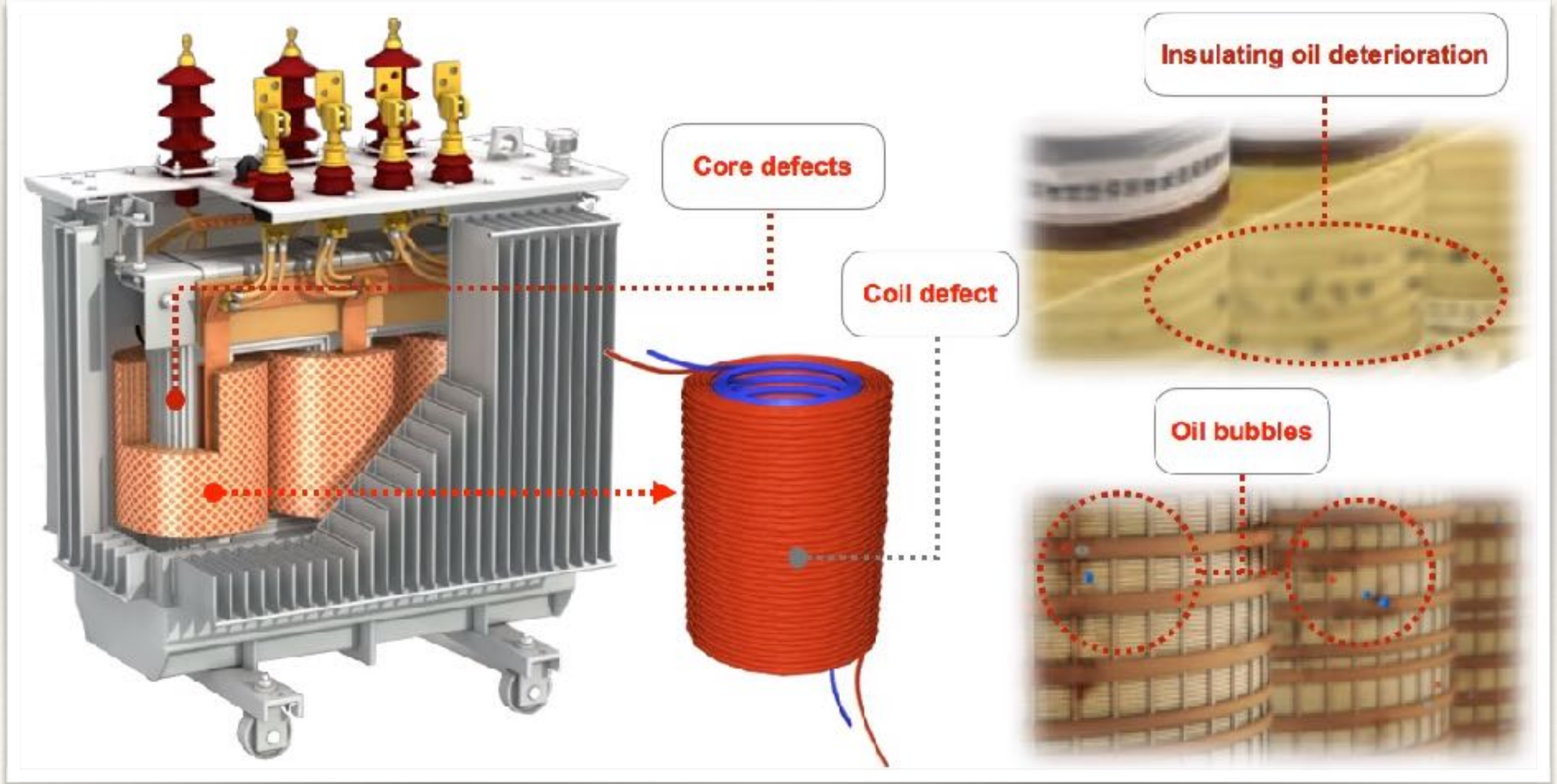
- Products and services：
  - Initial PD Monitor by PD Detector
  - Diagnostic PD Test by Wintech Power
  - Compatible sensors: AE, HFCT, TEV, UHF-FS, UHF Locator

- Suggested Instrument:
  - WINTECH POWER x 1
  - TEV Sensor x 1
  - HFCT Sensor x 1
  - AE Sensor x 1
  - UHF-FS x 1

WinTech® PD Application

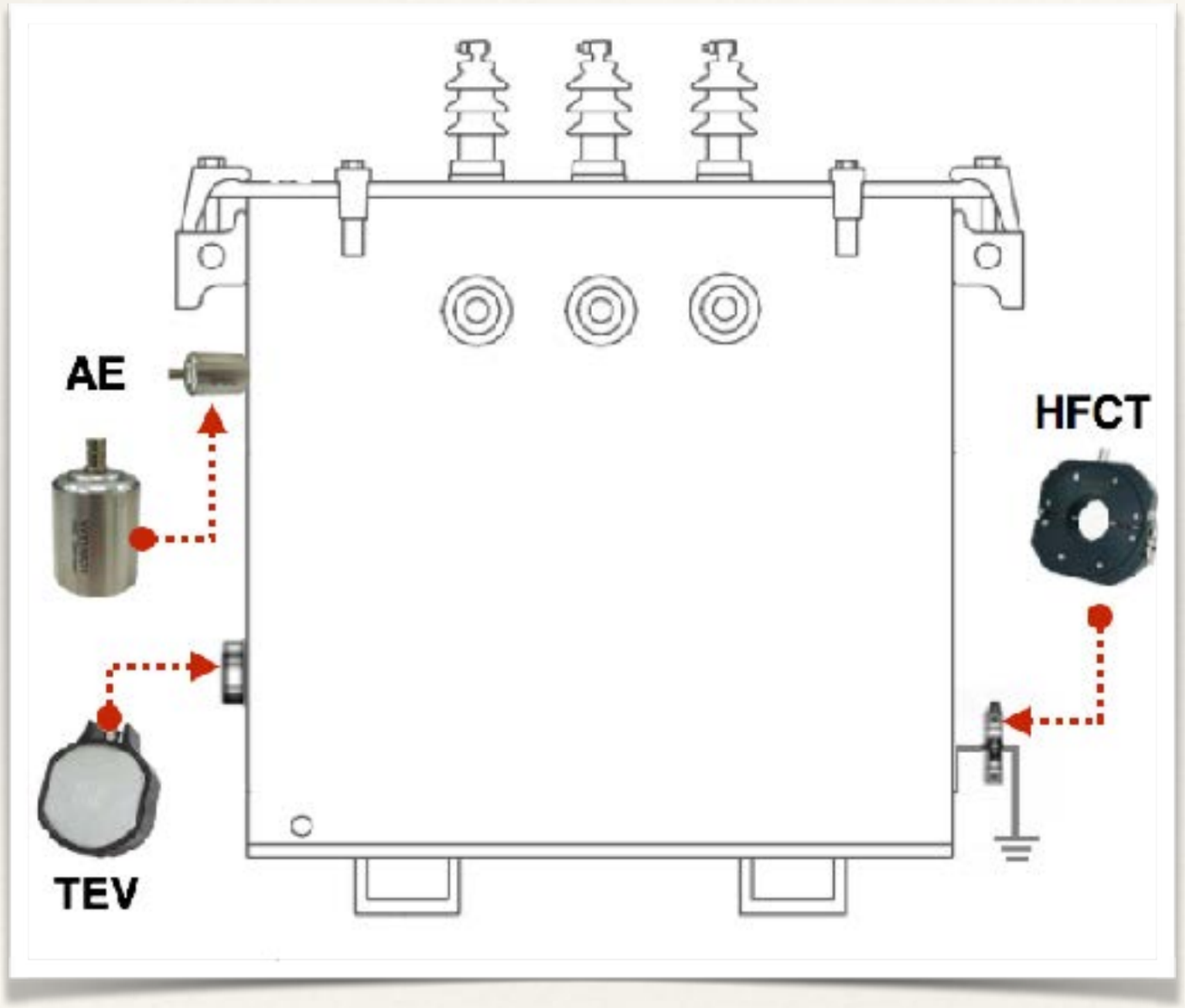
PD phenomenon of Oil Immersed Transformer - Case

Insulating oil deterioration | Metal protrusion | Bubble in insulating oil



WinTech® PD Application

PD phenomenon of OIL Immersed Transformer - Case



Sensors' Installation

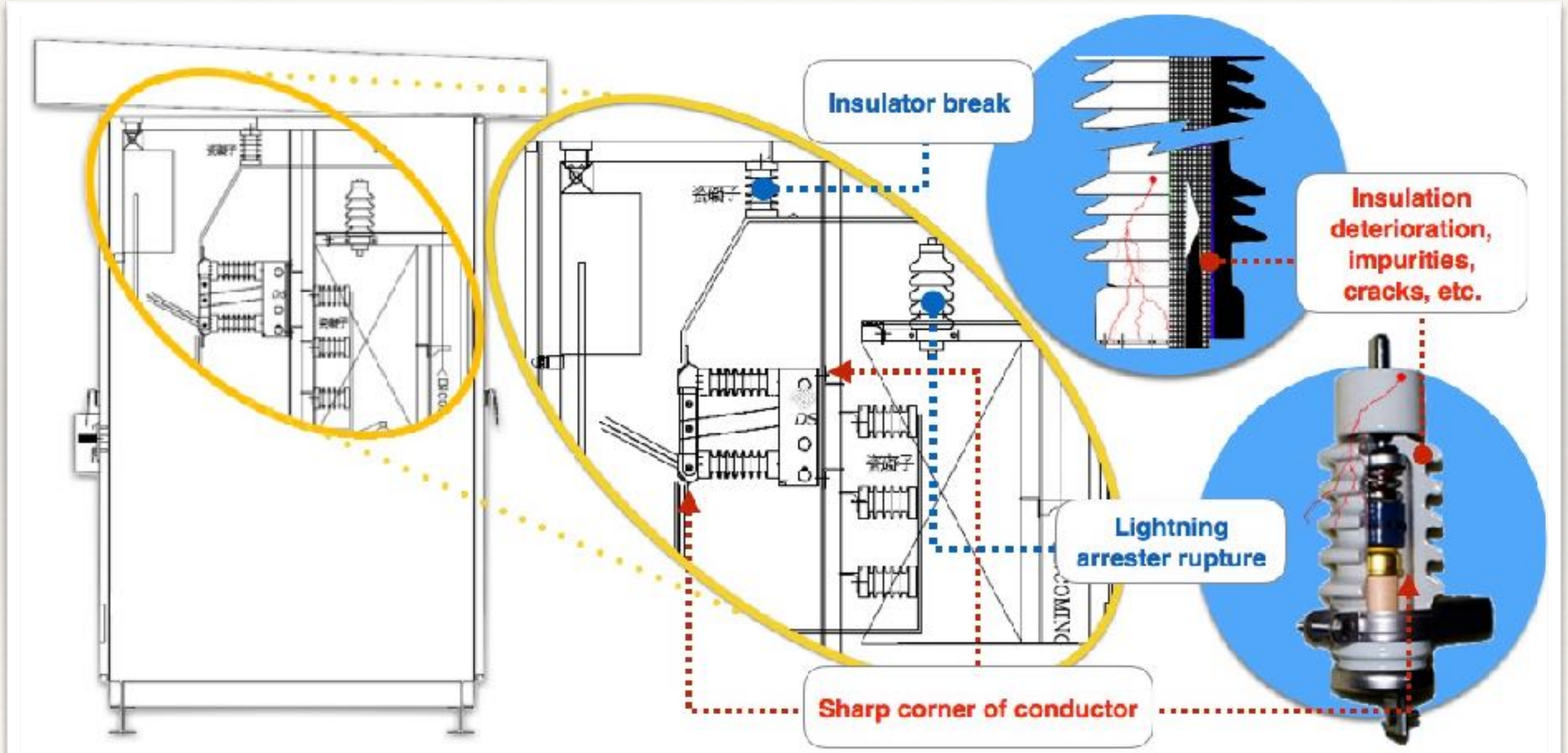
- Products and services :
  - Initial PD Monitor by PD Detector
  - Diagnostic PD Test by Wintech Power
  - Compatible sensors: AE, HFCT, TEV

- Suggested Instrument:
  - WINTECH POWER x 1
  - TEV Sensor x 1
  - HFCT Sensor x 1
  - AE Sensor x 1

WinTech® PD Application

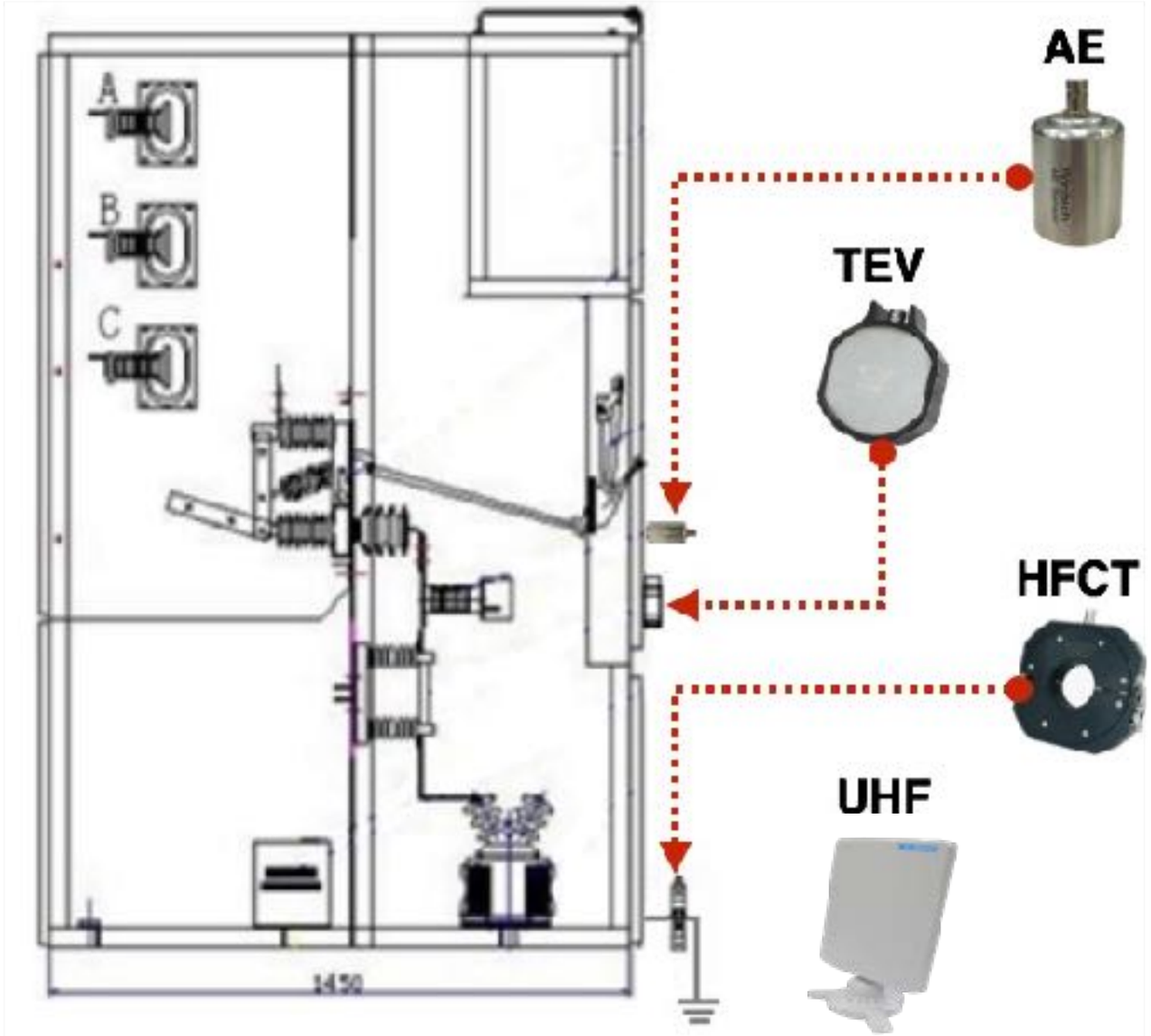
PD phenomenon of Switchgear discharge - Case

Insulation deterioration | Metal protrusion | Cracks | Poor connection



WinTech® PD Application

PD phenomenon of Switchgear Transformer - Case



Sensors' Installation

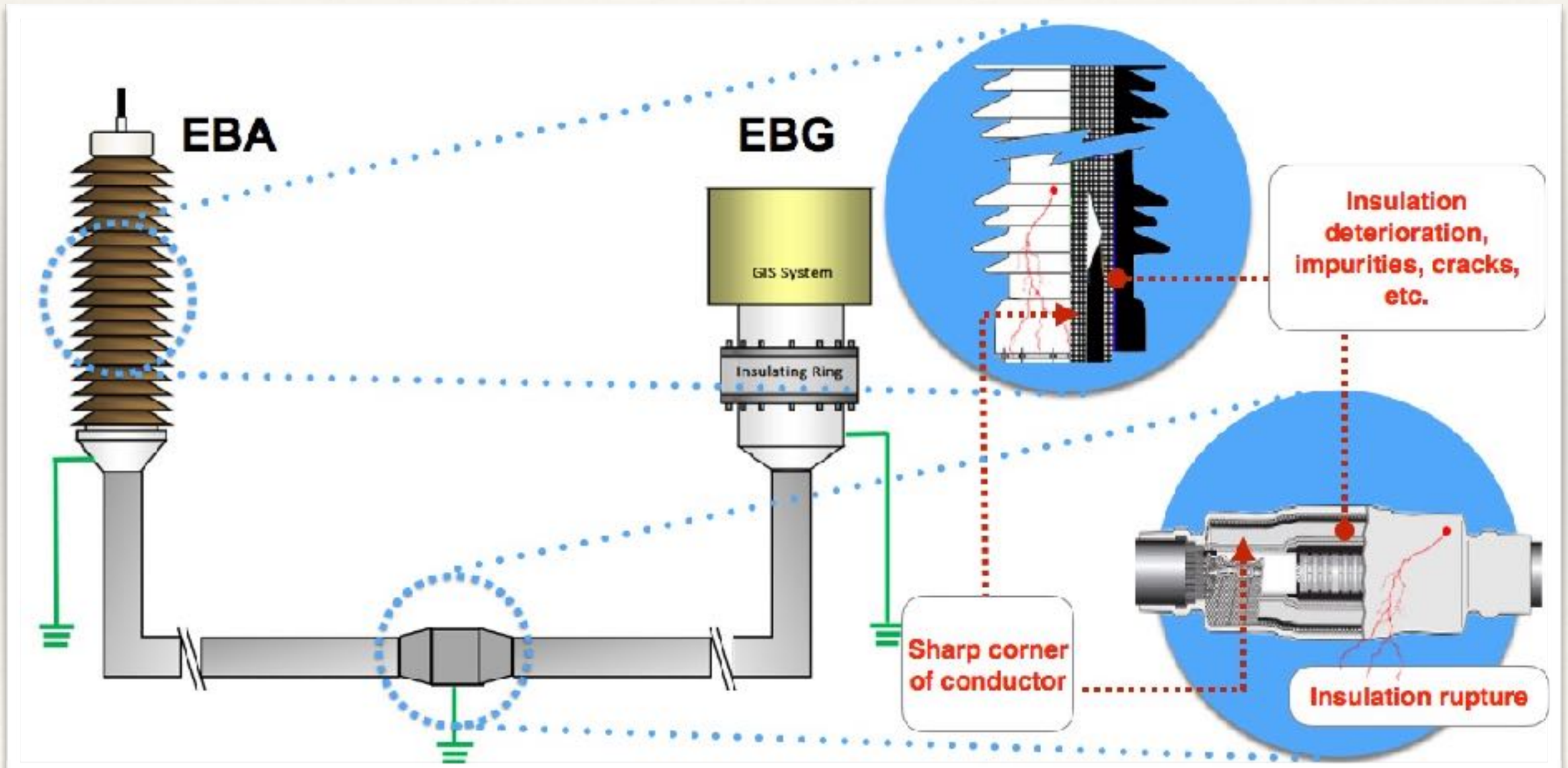
- Products and services：
  - Initial PD Monitor by PD Detector
  - Diagnostic PD Test by Wintech Power
  - Compatible sensors: HFCT, TEV, UHF-FS, UHF-GIS, UHF Locator
- Suggested Instrument:
  - WINTECH POWER x 1
  - TEV Sensor x 1
  - HFCT Sensor x 1
  - AE Sensor x 1
  - UHF-FS) x 1

PD Detector on-line monitoring

WinTech® PD Application

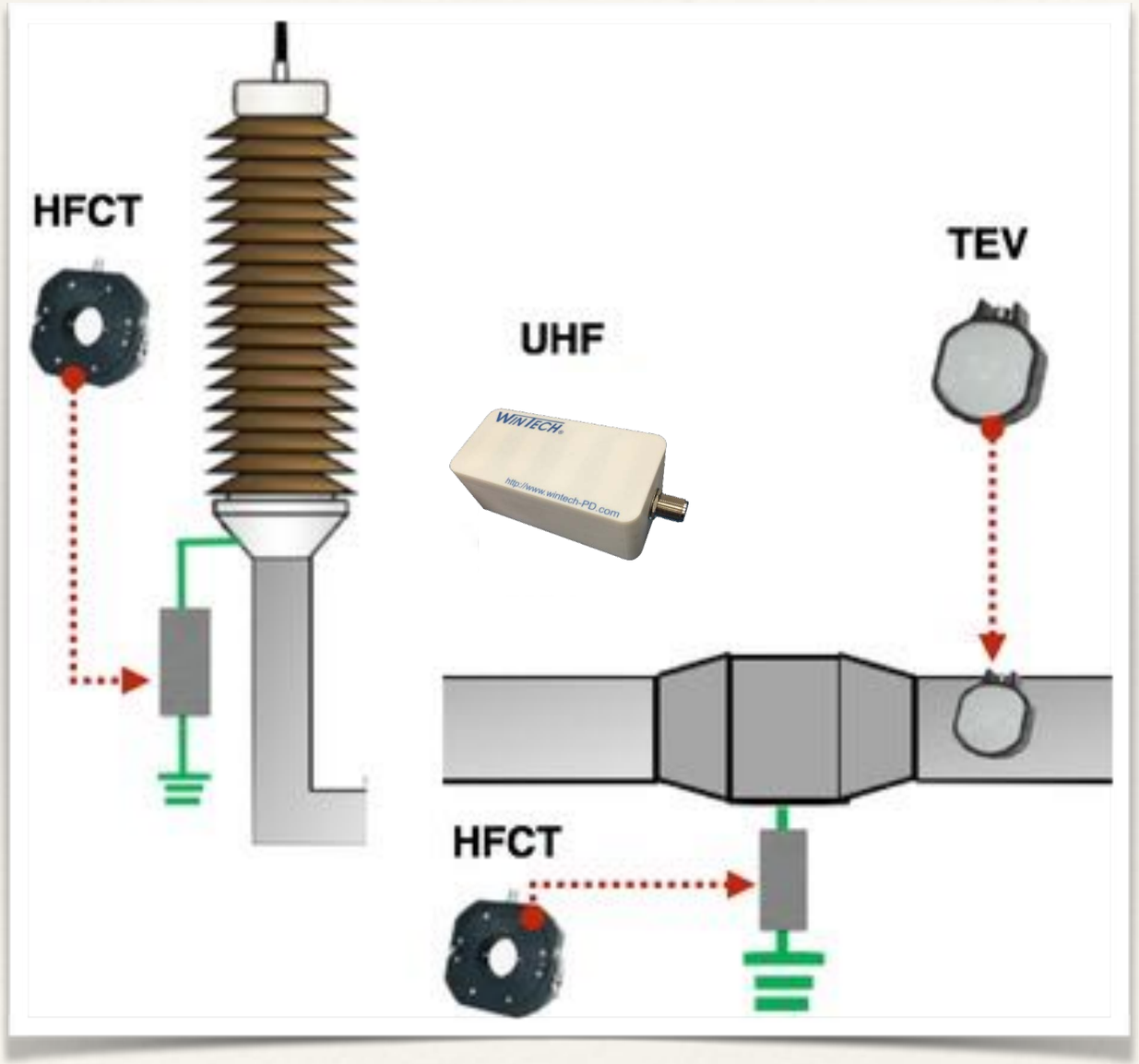
PD phenomenon of Power cables discharge - Case

Crack | Metal protrusion | Steam | Poor installation



WinTech® PD Application

PD phenomenon of Power cables discharge - Case



Sensors' Installation

- Products and services：
  - Diagnostic PD Test by Wintech Power
  - Compatible sensors: HFCT, TEV, UHF-FS
- Suggested Instrument for Termination
  - WINTECH POWER x 1
  - HFCT Sensor x 1
  - UHF-FS x 1
- Suggested Instrument for Joint
  - WINTECH POWER x 1
  - TEV Sensor x 1
  - HFCT Sensor x 1

WinTech® PD Products

Product summary

PD Diagnostic System – WinTech Power

PD Monitoring System – PD Detector

Ultra High Frequency Antenna Array Locator

High Frequency Current Transformer (HFCT) Sensor

Acoustic Emission (AE) Sensor

Transient Earth Voltage (TEV) Sensor

WinTech® PD Products

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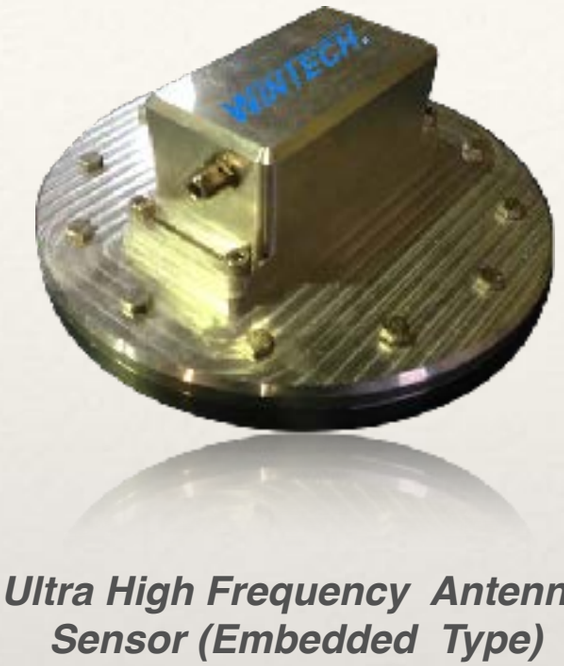
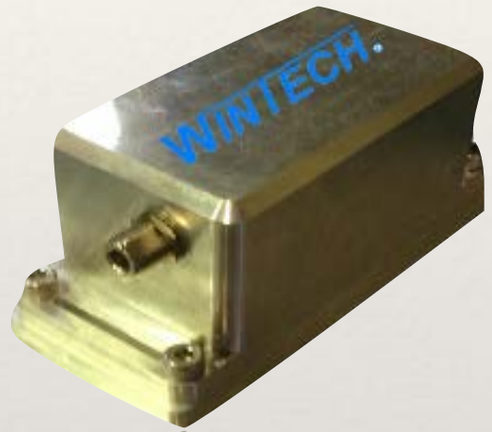
Ultra High Frequency Antenna Sensor (Free Space Type)



Ultra High Frequency Antenna Sensor (Embedded Type)

Ultra High Frequency Antenna Sensor (Bus-bar Type)



Ultra High Frequency Antenna Sensor (GIS Type)

WinTech® PD Products

WinTech Power

WinTech Power Technical Specifications			
Resolution	12 bits	Dimension	H : 291.7 mm
Sampling	2.5 GS/s		W : 399.4 mm
Bandwidth	500 MHz		D : 131.31 mm
Storage Capacity	12.5Mpts/Ch	Power	90 – 264 VAC
			45 – 66 Hz
Memory	4G		
Screen size	12.1”	Temperature	5°C – 40°C
channels	4 (Extension)	Humidity	95 % RH
OS	Windows 7	Weight	5.9 kg

- WinTech PD Diagnostic System is used for partial discharge (PD) testing on medium voltage (MV) and high voltage (HV) equipment, such as power cables, transformers, switchgears, etc.
- WinTech PD Diagnostic System is suitable for on-line monitoring and off-line testing. With our developed high quality sensors, the performance of PD diagnosis can further be enhanced.

WinTech® PD Products

WinTech Power-Features

- Wideband, high sample rate, high resolution：Accurately measured PD waveform.
- Large memory：Full waveform record for data analysis and identification.
- Simple user interface：Intuitive UI with real-time PRPD plot and data trend.
- Signal analysis software：Data analysis to achieve efficient diagnosis including PD identification, long-time trend chart, and report generation.
- Remote monitoring software：Off-site system control and setting with functions of offsite data backup and sending alarm e-mail.
- 24 hours PD on-line monitoring system: providing various detecting mode for customers' detecting requirement any time accordingly.

WinTech® PD Products

Wintech Power Detection Systems

PD Capture
Date acquistition, trigger level setting, data record

Core Tech

Alarm Email

AutoMail
Title, Contents setting, multiple users' email assignment

CxTraceLoad
Trend chart, PRPD plot, PD waveform, statistic results.

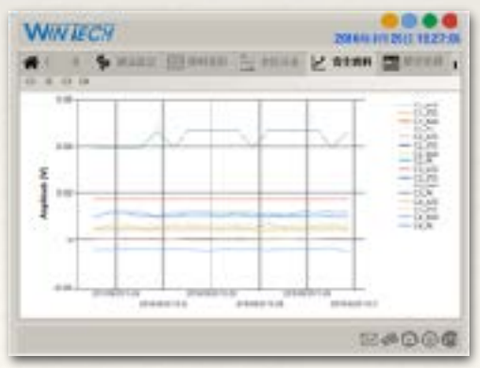
Date Reload

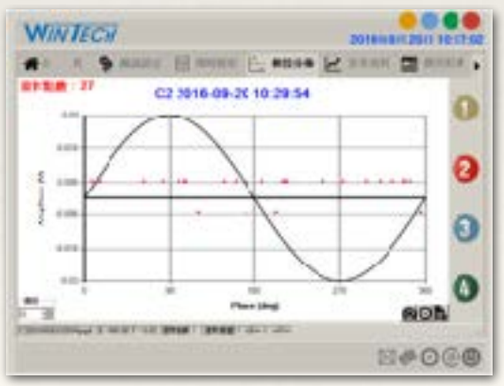
Remote Control

Data Upload

DataUpload
Data upload to server

RDPC Line





WinTech® PD Products

Partial Discharge Detector

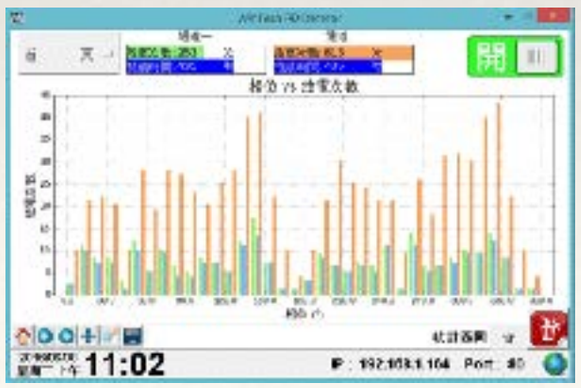
Technical Specifications	
Type	WPDD-1
Channels	2 (4 channels can be extended)
Band Width	80kHz - 40MHz
Measurment range	1mV - 2V(50Ω)
Power	90 - 264 VAC / 45 Hz- 66 Hz
Dimension	220mm x 170mm x 140mm
Weight	2.0kg

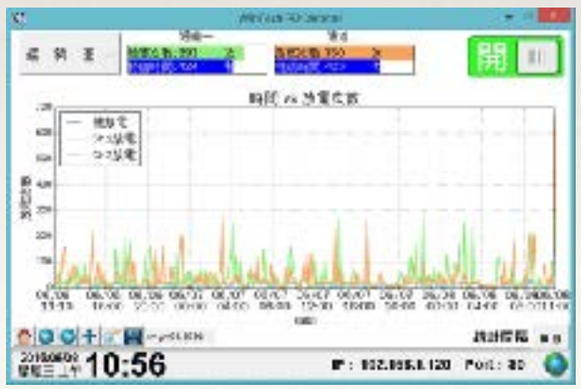
- Suitable for various power equipment detection
- Instant alert email
- Two channels for PD signal identification
- Economical and efficient

WinTech® PD Products

Partial Discharge Detector-Features

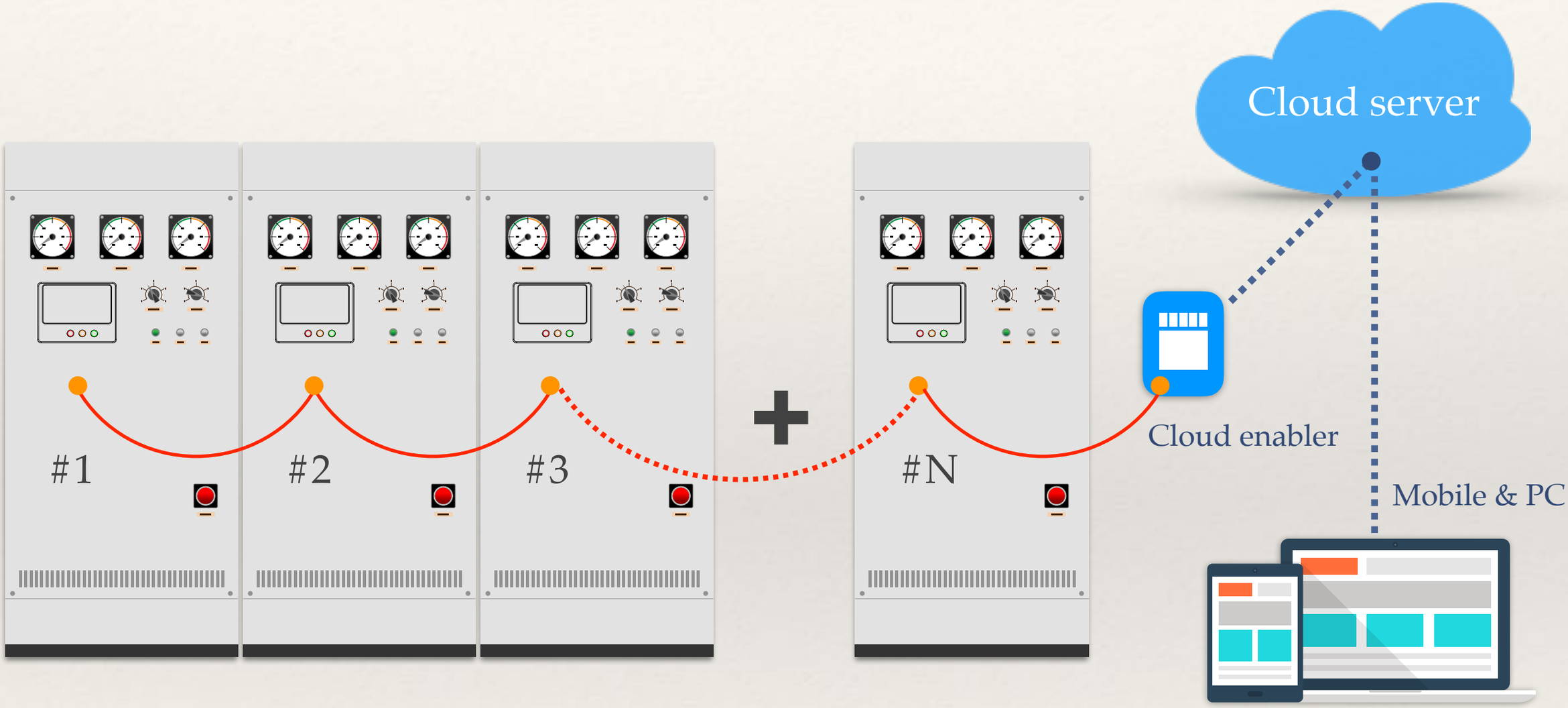
- Diagnosing the insulated deterioration of power equipment, to avoid equipment broken and property lost, is suitable for transformers, switchgear, GIS, etc.
- Two-channel partial discharge detection, including signals of transient earth voltage (TEV) and high frequency impulse current (HFCT).
- Two signals comparison for PD identification, eliminating jamming from signal outside, avoiding false alarm.
- Phase Resolved Partial Discharge (PRPD) analysis corresponds with partial discharge occurrence frequency to identify the PD signal accurately.
- PD progress data record, creating trend chart, predicting insulated condition in advance.
- Automatic alert Email send to clients.
- PD Detector is the best instrument to detect early failure of power equipment.





WinTech® PD Products

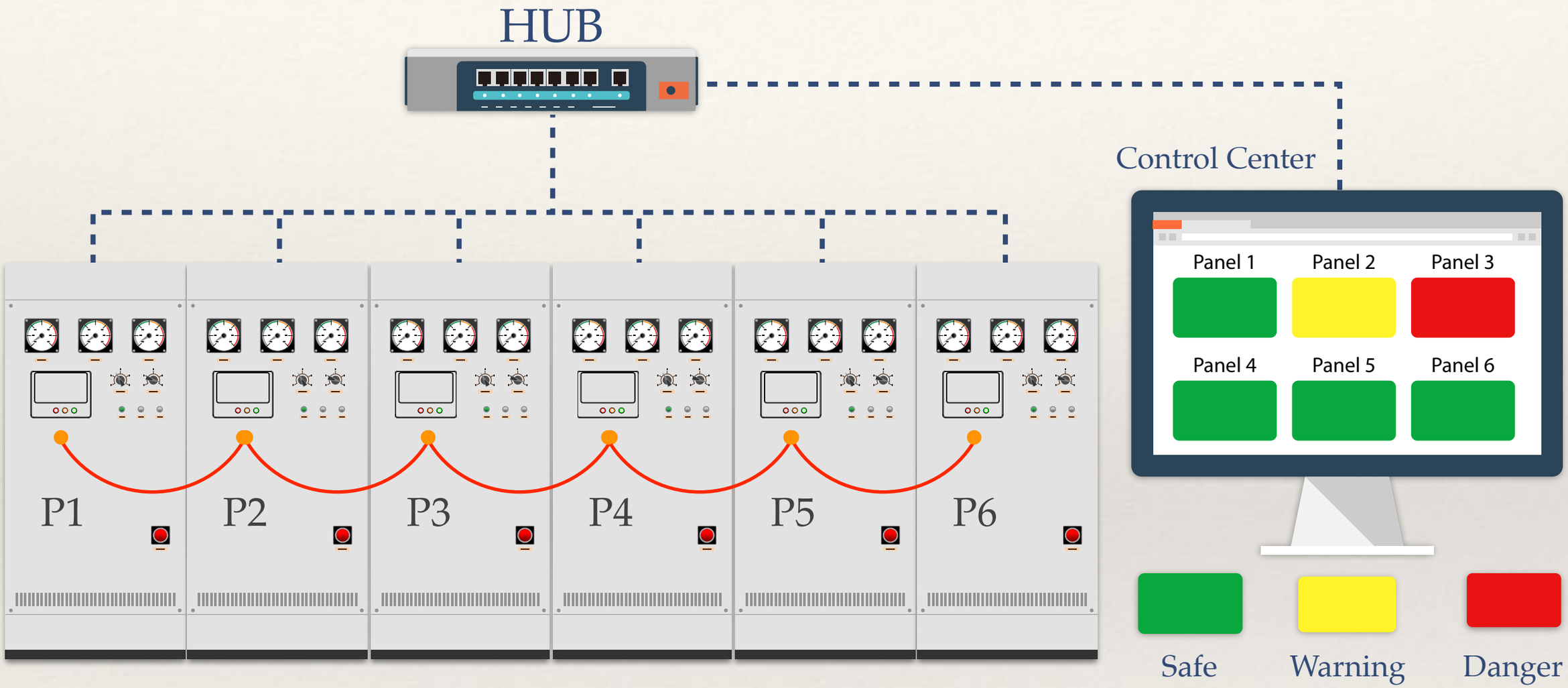
Wintech PD Detector can be realized monitoring by "Internet of Things"



- WinTech PD detector can be controlled remotely and transmit analytical results via internet and thus it is indeed an illustration of "**Internet of Things**" applied for power quality monitoring.

WinTech® PD Products

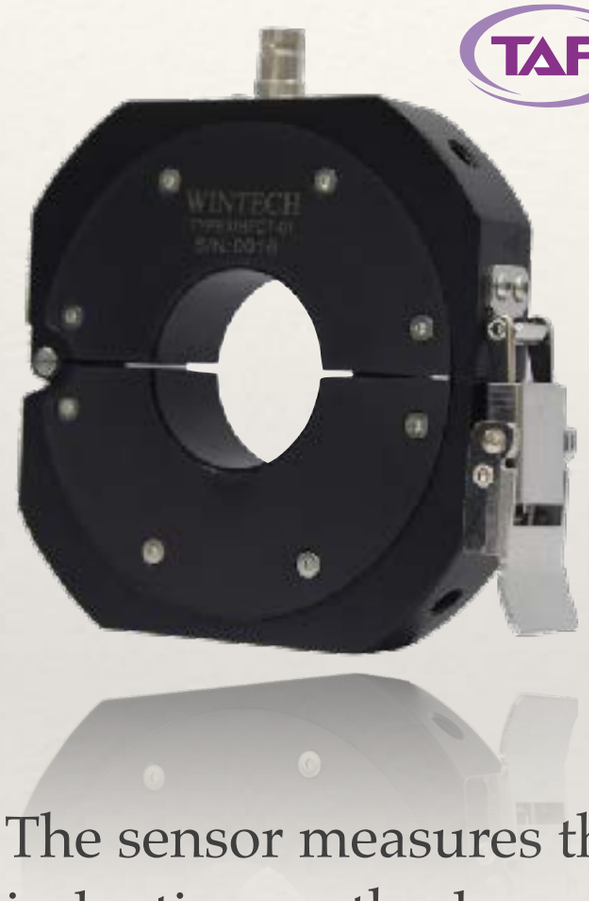
Wintech PD Detector can also be compatible with "Smart Grid"



- WinTech PD detector can also be compatible with Smart Grid to upgrade the safety and reliability of power system.

WinTech® PD Products

High Frequency Current Transformer Sensor (HFCT Sensor)-Features



Technical Specifications	
Bandwidth	10 MHz – 100 MHz
Connector	BNC female
Weight	600 g
Dimension	113 mm x 113 mm x 24.2 mm

- The sensor measures the high frequency impulse current by the electromagnetic induction method.
- With clamp-on installation structure.
- Suitable for installing on ground wire of HV equipment.
- Fast response and wide bandwidth.

WinTech® PD Products

Transient Earth Voltage Sensor (TEV Sensor)-Features

Technical Specifications	
Bandwidth	40 MHz – 80 MHz
Connector	BNC female
Weight	160 g
Dimension	80mm x 60mm x 28mm

- The sensor is magnetically attached to the outer surface of high-voltage equipment.
- Suitable for metal-clad power equipment, such as oil-immersed transformers, switchgear, GIS, etc.
- Fast response and wide bandwidth.

WinTech® PD Products

Acoustic Emission Sensor (AE Sensor)-Features

Technical Specifications	
Center frequency	65 kHz
Connector	BNC female
Weight	160 g
Dimension	45 mm X 45 mm X 45 mm

- The sensor is magnetically attached to the outer surface of high-voltage equipment.
- Suitable for metal-clad power equipment, such as oil-immersed transformers, switchgear, GIS, etc.
- Fast response and wide bandwidth.

WinTech® PD Products

Ultra High Frequency Antenna Array Locator

Technical Specifications	
Bandwidth	500 MHz – 3000 MHz (V.S.W.R <3)
Connector	SMA female
Weight	2.1 kg
Dimensions	Φ 380 (mm)

- Detecting microwave signals caused by PD.
- UHF sensor with high directivity for PD location.
- Suitable for PD location of high voltage switchgear and Cast-Resin transformer.
- Laser spot installed for the positon identification.
- Frequency shifter (optional).

WinTech® PD Products

Ultra High Frequency Antenna Sensor (Free Space Type) -Features

Technical Specification	
Bandwidth	500 - 3000MHz (V.S.W.R <3.5)
Maximum Gain	5 dBi
Polarization	Linear Polarization
Impedance	50 Ω
Connector	BNC Female
Dimension	243 x 172 (mm) H x W
Weight	325 g
Power Supply	Only for optimal devices (frequency shift)

- Detecting microwave signals emitted by the partial discharge.
- High directivity can detect accurately for a single high-voltage equipment.
- High directivity characteristics, reducing the impact of noise interference in environment or peripheral signals。
- Reduce frequency measurement (optional).

WinTech® PD Products

Ultra High Frequency Antenna Sensor (Bus-bar Type)

Technical Specifications	
Bandwidth	300~3000MHz
Maximum Gain	2 dBi
Antenna polarization	Linear polarization
Impedance	50 Ω
Connector	N Type
Dimension	150mm(L) x 70mm(W) x 50mm(H)
Weight	150 g

- Wide bandwidth and small size PD sensor.
- Detecting microwave signals caused by PD.
- High directivity can reduce the impact of interference from the surroundings.
- Frequency shifter (optional).

WinTech® PD Testing Sevice

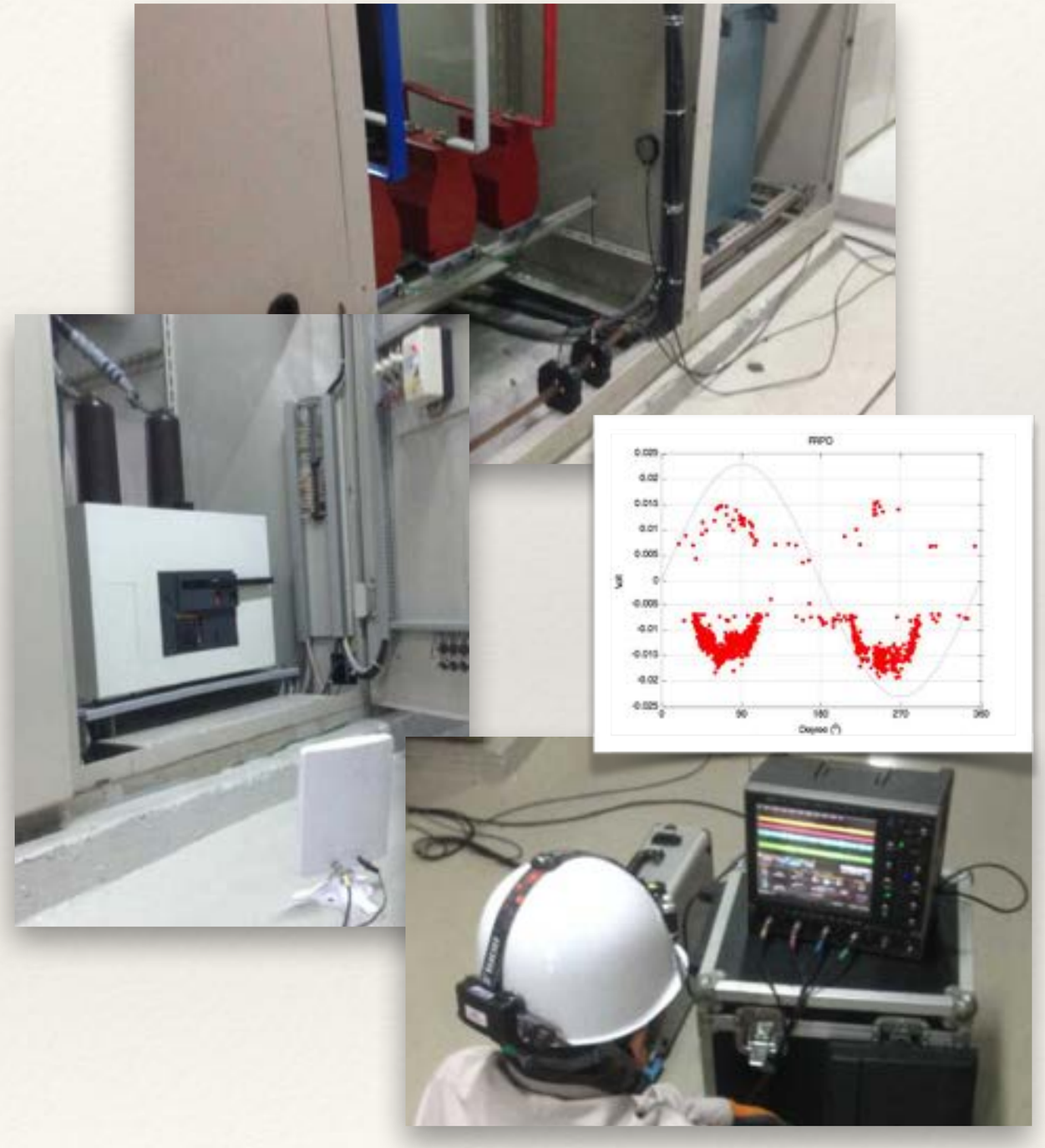
Time-Based Maintenance

- **Advantage**
  - Reduce the risk of high-voltage equipment due to insulation aging and insulation deterioration
  - Reduce operating cost
- **Characteristic**
  - Understand insulation condition of HV equipment
  - Optimal organization and suggestion of clients' HV assets
  - Analytic report for clients' requirement

WinTech® PD Testing Sevice

Condition-Based Maintenance

- **Advantage**
  - Systemic administration of High voltage equipment
  - Provide optimal inspection plan of HV equipment
  - Optimal equipment maintenance plan and reduce operating costs
- **Characteristic**
  - Testing and consulting
  - The best monitoring plan for high-voltage equipment
  - Completely monitoring of high voltage equipment
  - Provide understanding of insulation condition for HV equipment
  - Detail report of on-site test



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