



# APM Technologies

A Global Leader in  
Partial Discharge  
Monitoring System



# 01. ABOUT APM

A Global Leader in  
Partial Discharge  
Monitoring System

## Vision

To be a Global Leader in PDMS (Partial Discharge Monitoring System) through a clear value proposition with market leading advanced technologies

&

## Mission

To provide the highest level of quality and professional services for the ultimate value to the customers in our business areas



# Company Introduction

**APM Technologies Inc.,  
A Global Leader in  
Partial Discharge Monitoring System**

**“The World’s First Approved PD Monitoring Manufacturer  
by Saudi Electricity Company”**

APM Technologies Inc. (APM) is a global leader in partial discharge monitoring system located in South Korea that develops technologies for partial discharge monitoring system and analysis for the enhancement, reliability, and maintenance of substation facilities, especially for their Gas Insulated Switchgear, Transformer, Medium Voltage Switchgear and EHV Cables. APM’s products enable the intelligent digital substation by means of supporting global smart grid standards such as IEC61850.

APM (Advanced PD Monitoring) series have been adopted for numerous governmental and private projects around the world, and approved world’s first by Saudi Electricity Company. APM 5000 is the on-line, real-time, fixed system to measure the PD in GIS. APM 2000 is portable and it detects, analyzes and records ultra-wide-bandwidth of electro wave signals by highly sensitive UHF sensors in all voltage ranges which can be generated by partial discharge in GIS.

Electric power facility diagnosis trends are moving from off-line diagnosis (diagnosis during power stoppage) toward on-line diagnosis (diagnosis in real time during use). As a result of the rapid developments in technologies, APM Technologies Inc. is on the forefront of the new diagnostic capabilities. Our competitive technologies come from excellent engineers who have high level of skills from their experiences in the Partial Discharge Diagnostics industry.



# Our Work Scope

Design Manufacturing

1

### Design

Design PDMS as per requirements on each substation layout

2

### Manufacturing

Manufacturing PDMS Products  
- APM5000, APM3000,  
APM2000, APM1200, Sensors, SWs



### Training

Training on PDMS

3

### Supervision

Installation and Commissioning

4

### Service

PD Diagnosis Service at site  
- GIS, TR, MVSG, etc.

5

Training Supervision Service

# Company History

2008

**July** ▶ Established

2010

**February** ▶ ISO 9001:2008 certified

▶ ISO 14000:2008 certified

**August**

▶ R&D Center certified by KOITA

▶ Certified member of "One-KEPCO Expert Business Group" organized by KEPCO

2011

**September** ▶ Performance certified by Zhuhai QINYUN S/S in China

**October** ▶ APM5000 Contract with Taiwan TPC for 3rd Nuclear Power Plant

**November** ▶ 2 Patents registered

- Monitoring GIS PD (10-1402887)

- External sensor detecting GIS PD (10-1438171)

**December** ▶ APM1000 R&D project with Small and Medium Business Administration

2012

**October** ▶ APM5000 Contract with CLP Power Hong Kong for 400kV

**December** ▶ Performance certified by Jiangsu Changshu Power in China

▶ Performance certified by KEWP (Korea East West Power, a subsidiary of KEPCO)

2014

**February** ▶ Listed ADNOC's pre-qualified vendor in Abu Dhabi

**December** ▶ APM5000 & APM2000 pre-qualification approved by SEC/NGSA

▶ APM3000 R&D project with Korea East-West Power Co.

2015

**February** ▶ Listed as pre-qualified manufacture by SEC/NGSA

**November** ▶ Participated in GCC CIGRE held in Saudi Arabia

**December** ▶ APM7000 R&D project with Korea South-East Power Co.

2016

**January** ▶ Multiple APM5000 Contracts with major EPCs in KSA for 380/132kV

**February** ▶ Participated in MEE held in United Arab Emirates

**September** ▶ APM1200 Contract with SEC/NGSA for 3 substations

**October** ▶ Online PD Diagnostic Measurement Contract with SEC/NGSA (3-year, 400 substations)



2008



2010



2011



2012



2014



2015-16



# 02. PRODUCTS

## Key Features

### PDMS with true UHF bandwidth

Superior accuracy and noise gating features based on the state-of-the-art UHF technology. Conventional PDMS systems may convert PD signals in UHF band to RF band because their systems do not have performance enough to analyze PD signals in UHF band directly. PDMS systems of APM Technologies include high performance data acquisition units that are enabled to analyze PD signals in UHF band without down converting.

### IEC 61850 certified

Supports the latest Substation Automation System including remote PD monitoring using IEC 61850 protocol.

### Unparalleled multi-step noise filtering method

- Step 1) Programmable hardware band pass filtering
- Step 2) Eliminating external noises by comparing signals from PD Sensors with Noise Sensor
- Step 3) Distinguishing various types of Noise signals including Mobile Network, WIFI by using Neural Network AI engine

### AI analysis

Signals measured from each PD Sensor are analyzed in real time based on the database by AI, and reported instantly with its cause in case they are PD signals. The AI database includes various types of defect including Protrusion Electrode, Floating Electrode, Defective Insulator, Free moving particle and Noises.

### Enhanced HMI

- ▶ Provides PD analyzing features using AI, Trend features which shows PD changes over time, and integrated features such as real time signal analysis
- ▶ Provides independent conditions setting according to each sensor's installation environment
- ▶ Provides user account and control management and regular automatic report generating features

### Expandability

In case more bays are added to an existing GIS where APM's PDMS has been installed, the PDMS can be expanded to support the additional bays by adding Local Units and PD Sensors with the minimum cost.

### Self-Diagnosis

- ▶ Monitors Local Units in HMI providing alarms and automatic recovery feature
- ▶ Provides PRPD, PRPS and other graphic charts for PD experts
- ▶ Stores and data for long period

### Why UHF Method?

- ▶ UHF PD detection method can be used for a wide range of high voltage equipment including GIS, GIB, AIB, Transformer, etc.
- ▶ UHF PD detection method can detect PDs earlier than other methods.
- ▶ UHF PD detection method can diagnose causes of defect in real time more accurately.

# APM 5000

On-line PD Monitoring System for GIS/GIB



APM5000 detects and alerts various defects inside GIS by analyzing UHF signals generated by partial discharge that can cause progressive deterioration of insulating materials, ultimately leading to electrical breakdown.

- ▶ Suitable for on-line partial discharge monitoring of extra-high voltage GIS and GIB
- ▶ Able to detect less than 5 pC according to CIGRE TF 15/33.03.05
- ▶ Compliant with EMC and electricity safety international standards such as IEC61000-4-X, IEC60255-5, IEC60068-2-X, IEC60529/2001, IEC60270, and CISPR22

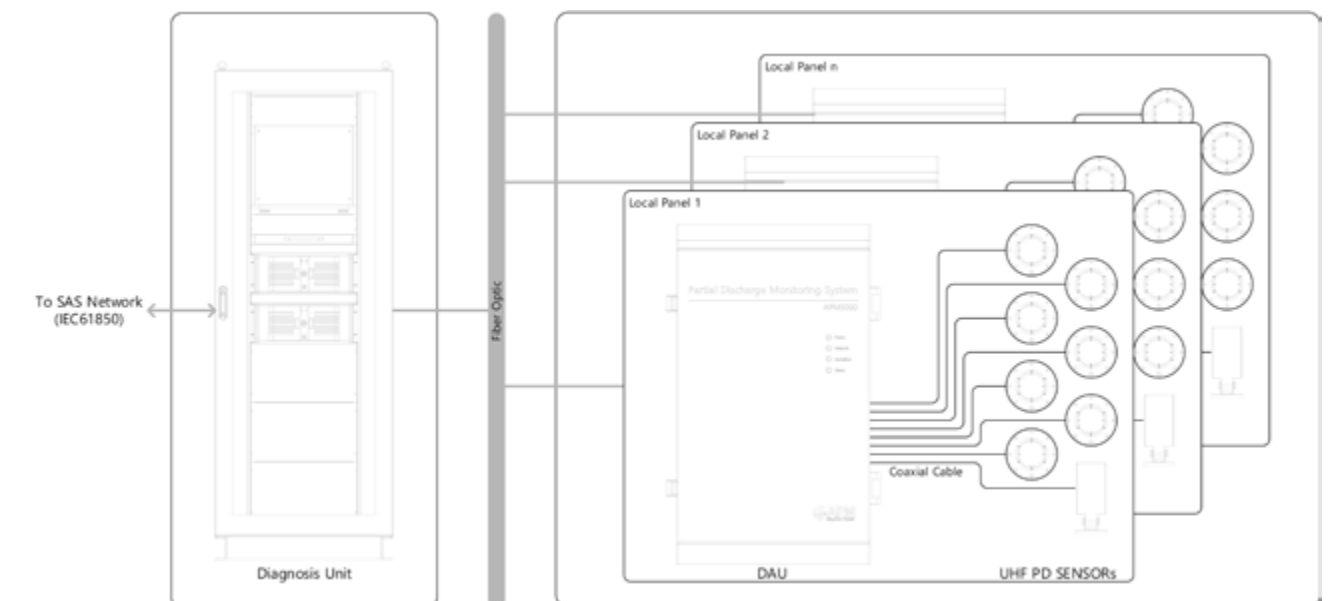
## Diagnosis Unit

Item	Specification
<b>Power</b>	90 to 240 VAC, 50/60Hz
<b>Input</b>	More than 250 channels
<b>Diagnosis</b>	Built in neural network engine classifies PD into 5 types: Protrusion Electrode, Floating Electrode, Defective Insulator, Free Moving Particle and Noise
<b>Alarming</b>	HMI, Email, IEC61850
<b>Graphic Tools</b>	PRPD, PRPS, Trend, and others
<b>Channel Configuration</b>	Three threshold levels for alarming can be configured for each channel individually
<b>IEC61850</b>	Enabled
<b>Remote Monitoring</b>	Enabled
<b>Communication</b>	10/100Base-T/TX Ethernet
<b>Storage</b>	Database
<b>Self Test</b>	Enabled

## Local Unit

Item	Specification
<b>Power</b>	90 to 240 VAC, 50/60Hz 120 to 370 VDC
<b>Input</b>	8 UHF Channels, N-Type Connector
<b>Sensitivity</b>	Can detect discharge less than 5 pC within monitoring area of GIS/GIB
<b>Input Bandwidth</b>	Wide Bandwidth 100 ~ 2000MHz
<b>Dynamic Input Range</b>	- 65 to 0 dBm
<b>Band Pass Filter</b>	Combination of 4 LPF and 4 HPF
<b>Noise Gating</b>	Enabled (External Noise Sensor)
<b>Communication</b>	Fiber Optic (100Base-FX)
<b>Notification</b>	4 x LED Status Indicators
<b>Operating Temperature</b>	-25°C to 55°C
<b>Operating Humidity</b>	100%
<b>Enclosure Rating</b>	IP54
<b>Dimensions</b>	355 x 625 x 270 (W x H x D) mm

## System Configuration



# APM 3000

On-line PD Monitoring System  
for Power Transformer



APM 3000 is an Online Partial Discharge Monitoring System (OPDM) for power transformers based on UHF partial discharge technologies. APM 3000 monitors and diagnoses various defects timely and accurately to support improved Condition Based Management (CBM) and to prevent serious breakdown of power transformers.

- ▶ Suitable for on-line partial discharge monitoring of extra-high voltage Power Transformer
- ▶ Distinguishes PD signals from similar noise signals by analyzing the characteristic of individual PD pulse signal in UHF bandwidth at time domain and frequency domain
- ▶ Able to locate defects causing PD inside transformer by comparing UHF signals from numbers of sensors installed in the transformer

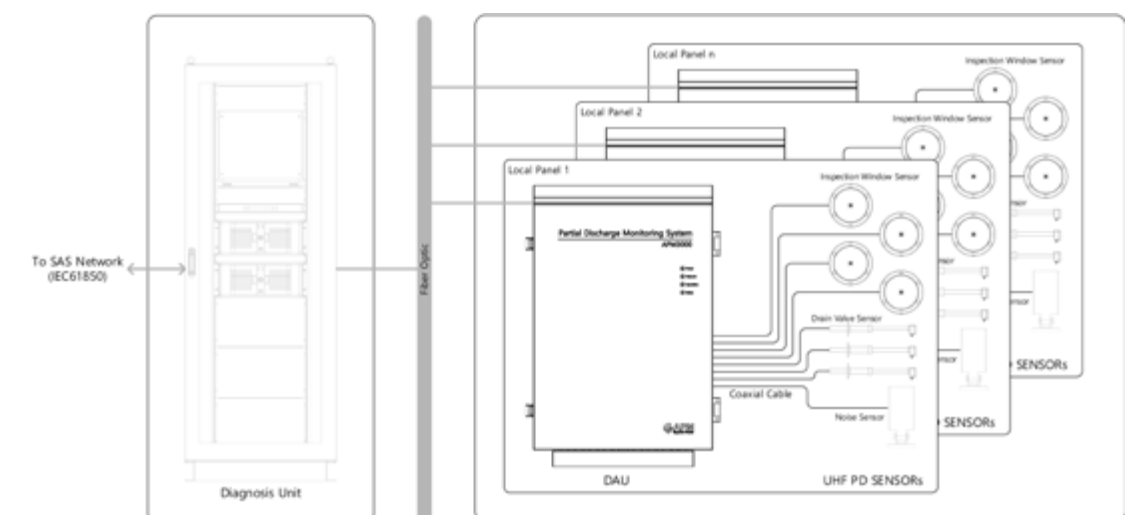
## Diagnosis Unit

Item	Specification
<b>Power</b>	90 to 240 VAC, 50/60Hz
<b>Input</b>	More than 250 channels
<b>Analysis</b>	Individual discharge signal is analyzed and its characteristics is mapped in 2-dimensional time-frequency space to make one group of discharge signals of one cause distinguished from others.
<b>Diagnosis</b>	Built in neural network engine classifies PD into 5 types: Protrusion Electrode, Floating Electrode, Defective Insulator, Free Moving Particle and Noise
<b>Alarming</b>	HMI, Email, IEC61850
<b>Graphic Tools</b>	T-MF, PRPD, PRPS, Trend, and others
<b>Channel Configuration</b>	Three threshold levels for alarming can be configured for each channel individually
<b>IEC61850</b>	Enabled
<b>Remote Monitoring</b>	Enabled
<b>Communication</b>	1000Base-T Ethernet
<b>Storage</b>	Database
<b>Self Test</b>	Enabled

## Local Unit

Item	Specification
<b>Power</b>	90 to 240 VAC, 50/60Hz 120 to 370 VDC
<b>Input</b>	8 UHF Channels, N-Type Connector
<b>Sensitivity</b>	Can detect discharge less than 5 pC within monitoring area of Transformer
<b>Input Bandwidth</b>	Wide Bandwidth 100 ~ 2000MHz
<b>Dynamic Input Range</b>	- 65 to 0 dBm
<b>Band Pass Filter</b>	Combination of 4 LPF and 4 HPF
<b>Data Acquisition</b>	Individual Discharge Signal Shape in Time Domain and Frequency Domain
<b>Noise Gating</b>	Enabled (External Noise Sensor)
<b>Communication</b>	Fiber Optic (1000Base-X)
<b>Notification</b>	4 x LED Status Indicators
<b>Operating Temperature</b>	-25°C to 55°C
<b>Operating Humidity</b>	100%
<b>Enclosure Rating</b>	IP54
<b>Dimensions</b>	450 x 703 x 300 (W x H x D) mm

## System Configuration





# APM 2000

Portable PD Monitoring System



APM 2000 detects and alerts various defects inside EHV/MV equipment by analyzing UHF signals generated by partial discharge. It monitors, records and analyzes PD signal continuously and alerts the condition of EHV/MV equipment with light-weight and small-sized equipment.

## System

- Suitable for the PD measurement of the extra-high voltage and medium voltage equipment
- Portable light-weight and small-sized equipment maintain PD analysis features
- Provides project management features for multiple PD sensors at multiple sites.
- Able to detect less than 5 pC according to CIGRE TF 15/33.03.05
- Compliant with EMC and electricity safety international standards such as IEC61000-4-X, IEC60255-5, IEC60068-2-X, IEC60529/2001, IEC60270, and CISPR22

Item	Specification
Power	90 to 240 VAC, 50/60Hz 120 to 370 VDC
Input	4 UHF Channels, N-Type Connector
Bandwidth	Wide Bandwidth 100 ~ 2000MHz
Dynamic Range	- 65 to 0 dBm
Band Pass Filter	Combination of 4 LPF and 4 HPF
Noise Gating	Enabled (External Noise Sensor)
Sensitivity	Can detect discharge below 5 pC within monitoring area
Diagnosis	Built in neural network engine classifies PD into 5 types: Protrusion Electrode, Floating Electrode, Defective Insulator, Free Moving Particle and Noise
Storage	Database
Communication	10/100Base-T/TX Ethernet
Operating Temperature	-25°C to 55°C
Operating Humidity	100%
Enclosure Rating	IP41
Dimensions	457 x 337 x 170 (W x H x D) mm

# SENSOR

## Internal Sensor



Frequency Range	300~2,000 MHz
Output Power (5pC)	Over -20 dBm
Impedance	50 Ω
Sensitivity	Below 5pC
Connector	N-Type
Material	Aluminum, MC Nylon
Install Position	GIS Enclosure

## External Sensor



Frequency Range	300~2,000 MHz
Output Power (5pC)	Over -20 dBm
Impedance	50 Ω
Sensitivity	Below 5pC
Connector	N-Type
Material	Aluminum, Epoxy
Install Position	GIS Spacer

## Noise Sensor



Frequency Range	300~2,000 MHz
Impedance	50 Ω
Connector	N-Type
Material	PE
Install Position	Near GIS

## Drain Valve Sensor



Frequency Range	300~2,000 MHz
Output Power (5pC)	Over -20 dBm
Impedance	50 Ω
Sensitivity	Below 5pC
Connector	N-Type
Material	Steel, MC Nylon
Install Position	Transformer Drain Valve

## Window Sensor



Frequency Range	300~2,000 MHz
Output Power (5pC)	Over -20 dBm
Impedance	50 Ω
Sensitivity	Below 5pC
Connector	N-Type
Material	Steel, MC Nylon
Install Position	Transformer Enclosure



A group of business professionals in a meeting, smiling and looking at documents. The image shows a man in a blue striped shirt in the foreground, smiling and looking towards the right. Behind him, a woman and another man are also smiling and looking at documents. The background is a bright, modern office setting.

# Trust of APM

The World's First  
Approved PD Monitoring  
Manufacturer by  
Saudi Electricity Company



# 03. REFERENCES



## Saudi Arabia

Customer	Project	Product
SSEM	New-Azizyah 132kV GIS	APM5000
	Dammam Housing 115kV GIS	APM5000
alfanar	Al Khafji 115kV GIS	APM5000
	Dammam North 115kV GIS	
	Nariyah North 115kV GIS	
SEPCO III	Al Zulfi 380/132kV GIS	APM5000
NCC	New Salbouk 132kV GIS	APM5000
GE	Fadhili Gas Plant 380kV GIS	APM5000
	Jizan Power Plant 380kV GIS	
	Airport North 380/132kV GIS	
SEC/NGSA	PDMS for 3 MV Substations	APM1200
	3-Year Online Portable PD Diagnostic Measurement for 400 s/s	APM2000

## Hong Kong

Customer	Project	Product
CLP	400/132kV GIS	APM2000
	400kV GIS	APM5000

## China

Customer	Project	Product
Zhuhai Power	252kV GIS Extended	APM5000
Jianbi Power Plant	500kV GIS	APM5000
Jiansu Changshu Power Generation	500kV GIS	APM5000
Shanxi Huxian	330kV GIS	APM5000
Tianjing Power 3rd Substation	330kV GIS	APM5000
Yandun	750kV GIS	APM5000
RINPAR	500kV GIS	APM2000

## Taiwan

Customer	Project	Product
TPC (3rd Nuclear Power Plant)	161kV GIS	APM5000
		APM2000

## Korea

Customer	Project	Product
KEWP	DangJin GCB/GIB	APM5000
KHNP	WOLSUNG Plant	APM5000 & APM1200
EWP	Dangjin Power Complex	APM3000
		APM2000
	Ulsan Power Complex	APM7000



# Partners & Clients

# Global Network

## Middle East

► **Authorities**

► **EPCs**

## Asia

## Korea

## Network

**APM Technologies Inc. KOREA**  
 5F B Building, 225-15, Pangyoyeok-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea 13494  
 Phone: +82-2-545-6286  
 Fax: +82-2-545-6287

**APM Technologies Inc. US OFFICE**  
 20 Maxwell Irvine, CA 92618 USA  
 Phone: +1-949-387-6554  
 Fax: +1-949-266-5666

**APM Technologies Inc. KINGDOM OF SAUDI ARABIA  
 FACTORY and TECHNICAL SUPPORT TEAM**  
 2989 Prince Mashur Ibn Abdulaziz, Al Mursalat, Riyadh, Kingdom of Saudi Arabia

**APM Technologies Inc. BAHRAIN**  
 #3454 Building 1398, Road 4626, Block 346, Sea Front, Manama, Bahrain

## Contact

**Product Quotes:** [sales@apmtech.co.kr](mailto:sales@apmtech.co.kr)  
**Information:** [info@apmtech.co.kr](mailto:info@apmtech.co.kr)



# Advanced Partial Discharge Monitoring System



## APM Technologies, inc.

5F B Building, 225-15, Pangyojeok-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea

Tel +82-2-545-6286 Fax +82-2-545-6287 Homepage [www.apmtech.co.kr](http://www.apmtech.co.kr)

Copyrights © 2016 APM Technologies, Inc. All rights reserved.

APM – 5000, 3000, and 2000 are trademarks of APM Technologies, Inc. All other trademarks are the property of their respective owners. Information in this document is subject to change without notice.