PD MONITORING

(Is designed and manufactured by IPEC Ltd)

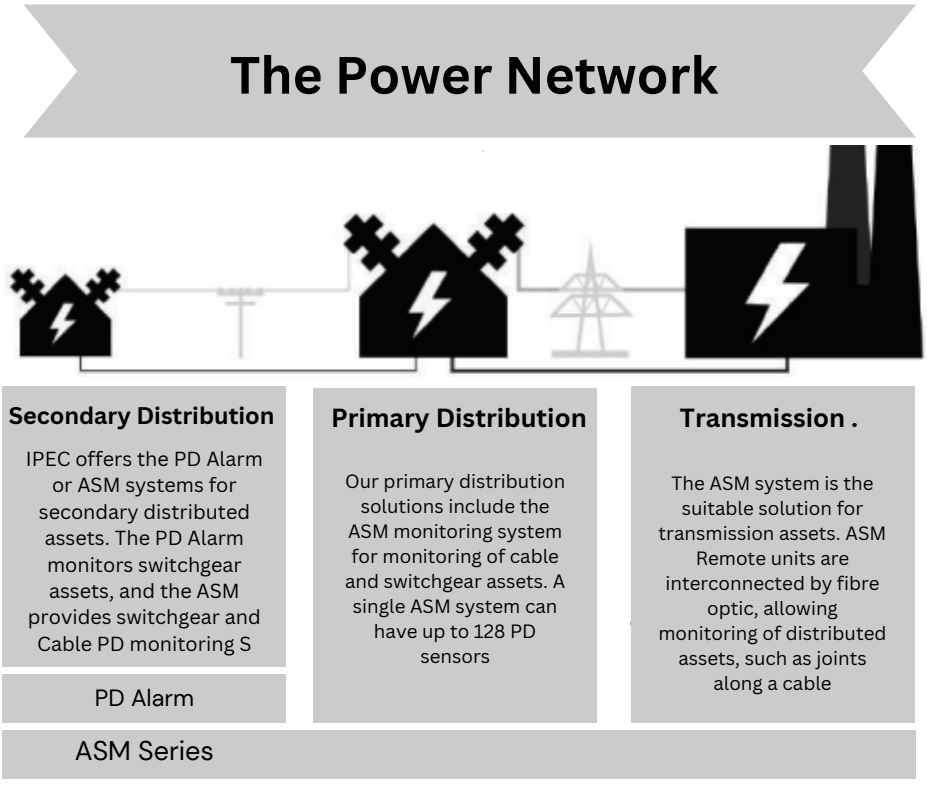
- PD Alarm
- ASM-Portable
- ASM-Mini
- ASM-Remote
- ASM-Central

Our Products in Power Networks

IPEC's PD Monitoring systems form the core of our product range. We design, manufacture and install online PDmonitoring systems across the power network. From EHV transmission sites to small MV secondary distribution networks, IPEC has a monitoring solution to suit all customer needs.

The IPEC PD Monitoring system technology is installed in More substations worldwide than any other online PD monitoring system.

The PD monitoring systems use high resolution data acquisition, advanced noise rejection and robust data analysis solutions which give our customers peace of mind that their assets are safe, secure and being monitored 24/7 By the best technology on the market.



PD Alarm

PD Alarm is an asset mounted device for indicating the presence of partial discharge in high voltage switchgear, ring main units (RMUs) and transformers. Designed for use in small substations, the instrument can activate local and remote alarms in addition to local indication.

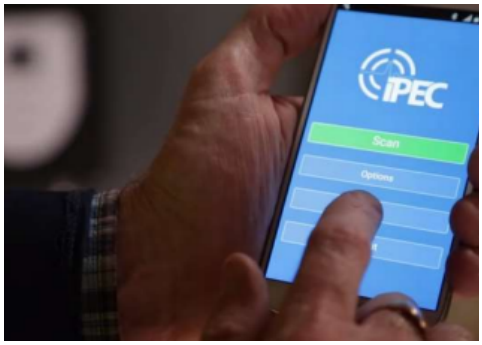
The PD Alarm is built into a tough case that magnetically mounts to the RMU. Installation is very quick and simple with only a power connection required to get the system operational. Alarms can be configured to operate either locally with SCADA or remotely using an optional integrated modem.
The system incorporates algorithms that distinguish noise from real PD, significantly reducing the likelihood of getting false alarms.

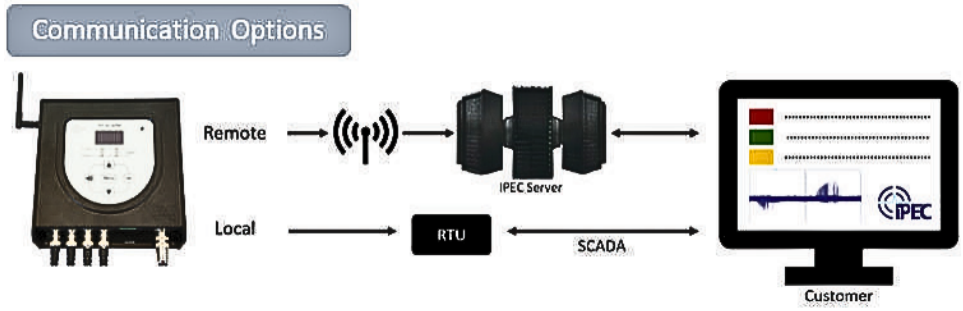
Avoid Power Outage	Cost Effective	Failure Prevention
Early warning about Defects that can lead to failure	Designed for larger scale roll out across distributed assets	Implement as part of a Condition Based Maintenance program

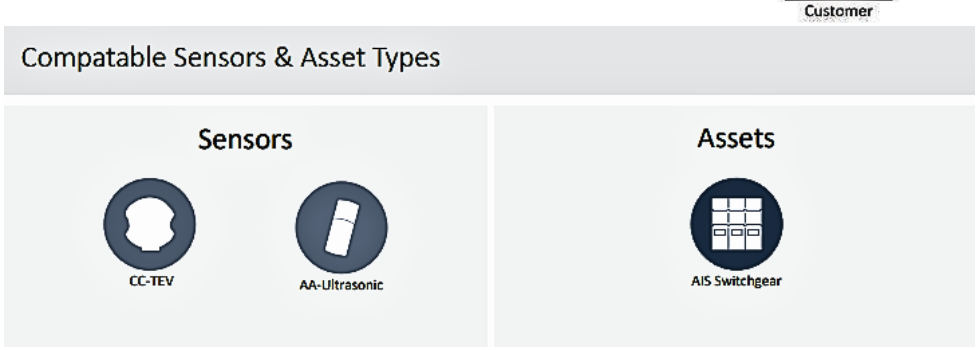
Permanent PD Monitoring for Switchgear

Key Features

- **Display -** Ultrasonic and TEV level displayed in dB
- **Alarms -** Current alarm and historical alarm indication
- **TEV -** Measurement of electrical transients generated by internal PD
- **Ultrasonic detection** - 3 independent ultrasonic channels detecting surface PD and tracking
- **Integrated Noise Detection -** Algorithm helps avoid 'False Alarms'
- **Simple to install -** No wiring required between PD detector and central hub
- **Remote Data Analysis -** the PD Alarm's optional tablet sotiware allows for data analysis on the move







ASM Serie

ASM On-line PD Monitoring Systems are partial discharge monitors for continuous testing of cables, switchgear, GIS, dry-type transformer and other substation assets. Suitable for MV, HV and EHV equipment, the ASMTM is a powerful tool for asset managers, providing continuous on-line condition data that can be easily accessed via a secure website, called ISM. The ASM on-line partial discharge monitor can be installed in distribution substations and industrial networks. The ASM monitor including a series of product to best suits different HV network layout and requirements: **ASM-Portable, ASM-Mini, ASM-Remote, ASM-Central**. All products in ASMTM Series are compatible with IPEC's range of PD sensors, including high frequency CTs for monitoring cable health, capacitive and ultrasonic sensors for monitoring switchgear and transformer condition, UHF sensors for monitoring GIS condition, and temperature, humidity and pressure sensors for environment monitoring.

Online PD Detection	Fully Customisable	Remotely Accessible
The ASM uses PD sensors that couple to the HV network and equipment non-intrusively and online so that no disconnection of the circuits is required	The monitor is enclosed in a 19" cabinet allowing for customizable options such as cooling, UPS, and integration with existing equipment. For smaller sites, IPEC produce bespoke enclosures	Using a wide range of communication protocols, the ASM automatically downloads to a central database where it can be viewed on the analysis website, ISM, from any smart device

Online Partial Discharge Long Term/Medium Term Monitoring

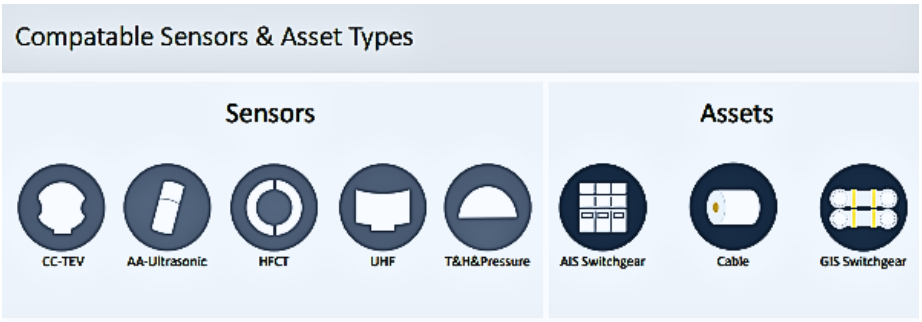
Key Features

• **Web based analysis -** A client specific secure website used for review and analysis of individual asset condition, this portal is accessible locally if server integrated into client network. No internet connect required.

• **Automatically download PD data -** ASM is in a monitoring network and regularly download PD data automatically to a centrally located server from where it is stored in a powerful database and made available to users via the iSM website

• **Alarm** - ASM can send alarms through email, SMS, and SCADA

• **Channels** - The highest channel capacity in ASM-Series can reach up to 128 PD sensors on one ASM-Central



ASM-Portable

ASM-Portable is a Partial Discharge monitor for medium term testing of cables and switchgear. Based on the highly successful ASM system for permanent installation, the ASM-P is installed into a substation for 4 weeks or more in order to build up a picture of the condition of plant assets where high PD levels may have shown during a spot test and a temporary monitoring system needs to be implemented to ensure asset health in the short term.

Fully Portable

The 32-channel monitor is enclosed in a tough IP rated carry case with extendable handle. At only 24kg the monitor can be easily and quickly transported to and installed on site

Short/Medium Term

ASM-P is designed for short or medium term monitoring. The system can be configured and set up by the user to collect data from installed sensors

Portable PD Monitoring

ASM-Mini

ASM-Mini is a Partial Discharge monitor for permanent testing of cables and switchgear. The system has the full functionality of our ASM Series systems but in a small, robust package. The unit is designed for applications requiring a small number of sensors.

Light and Robust

The 4 channel monitoring system is enclosed in an IP rated case, and is wall mountable. The unit has integrated wireless communication modules for quick connection to central servers

Fewer Channels

The compact design allows for up to 4 sensor channels, in any combination with IPEC's HFCT, TEV, Ultrasonic or UHF sensors

Small Scale Permanent PD Monitoring

ASM-Remote

ASM-Remote is a Partial Discharge monitor for monitoring of distributed assets across a network or site. The ASM-R is often deployed in harsh environments, such as EHV cable tunnels and joint man holes. The systems link together via fibre optic to make monitoring of widely distributed assets , such as very long EHV cables, possible.

Industrial

The ASM-R can be configured with up to 20 channels per monitoring point, and installed in industrial environments. The housing can be upgraded to IP68.

Distributed Assets

ASM-R is our cost effective solution for large scale multi-location deployment of a monitoring system across a large site or along EHV circuits, bringing data back to a central location or web-server

ASM-Central

ASM-Central is a Partial Discharge monitor for permanent testing of cables and switchgear. The latest ASM model has been upgraded offering fast data acquisition, and analysis. IPEC's PD Monitoring system technology is installed in more substations than any other online PD monitoring system.

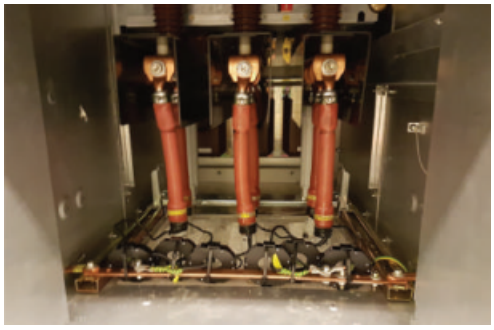
The Benefits

World Leading

In MV substation applications, the ASM-C is world leading and has a reputation for accurate and automated PD analysis of assets

Large Capacity

ASM-C is designed for monitoring complete substations and has a huge 128 sensor channel capacity, which can be used with any of our PD sensors



Large Scale Permanent PD Monitoring

ISM

ISM is a customer specific secure website is used for review and analysis of individual asset condition. This powerful tool allows users to drill down from a basic condition overview to highly detailed data including sampled PD wave shapes. The tool operates from the servers connected to the ASM systems. The service is either hosted locally inside one of the monitoring systems, on a customer server, or via the IPEC Data Centre in the UK. iSM is a tool for PD analysis across all your monitors in your HV network.

The Benefits

Manage All Assets

iSM shows all data from substations with summarised and detailed data. Users can see all assets from all monitored Substations in the network

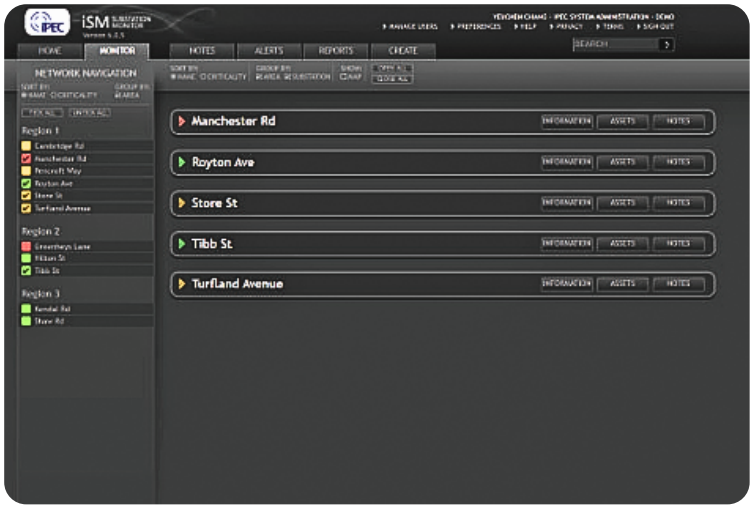
Criticality

The criticality level is shown by numbers and traffic light system. Traffic light system helps users to quickly identify the problematic substations or assets

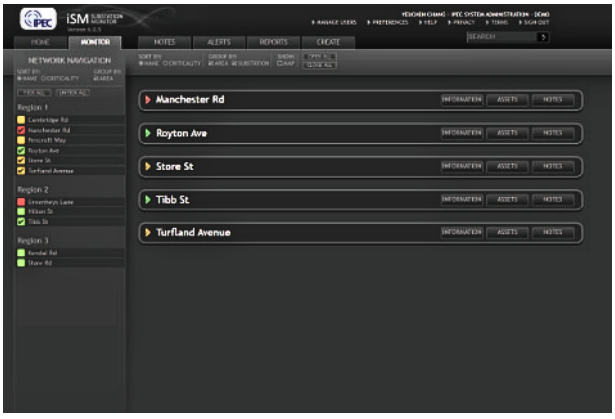
Detailed PD Data

Detailed PD data, including: PD magnitude, PD count, Phase Resolved PD, polar graph, clustering, PD Waveshape, and more

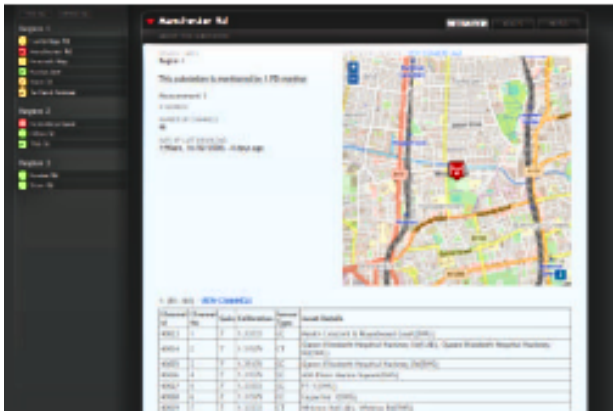
Advanced PD Data Analysis Tools



- Manage Full HV Network
- Traffic Light System
- Detailed Analysed PD Data
- Individual PD Pulse Data

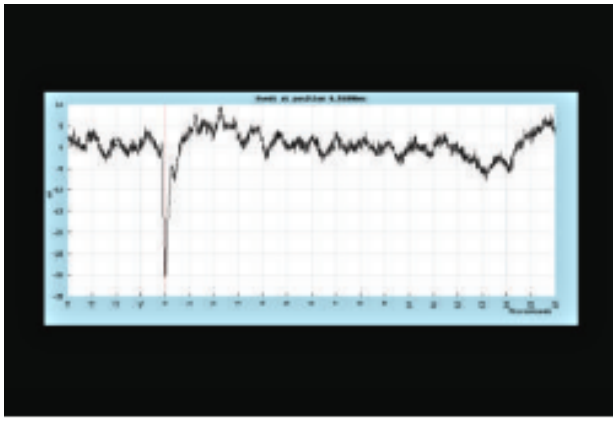


Traffic light system to show you different level of criticality for each substation and each asset



Other than PD data for each substation, iSM also shows detailed information of each substation, such as location, assets type and number, channel list...etc

Summarised PD data for each channel will be shown on iSM for users to easily identify problematic channels to examine further data analysis



In the "Data Analysis" function, iSM can present data for each individual PD pulse

Technical Specifications

	PD Alarm	ASM-Portable	ASM-Mini
Input Channels			
Number of Channels	4	32	4
Spike Protection	Yes	Yes	Yes
PD Monitoring			
Sensor Types	CC for TEV local PD AA for ultrasonic, surface tracking	HFCT for cable PD CC for TEV local PD AA for ultrasonic, surface tracking	HFCT for cable PD CC for TEV local PD AA for ultrasonic, surface tracking UHF for GIS PD Detection
Cable PD Range	-	10pC to 1,000,000pC+	10pC to 1,000,000pC+
TEV Range	0dBmV to 80dBmV	0dBmV to 60dBmV	0dBmV to 60dBmV
Acoustic Range	-6 dBµV to 70 dBµV	-6dBµV to 54dBµV	-6dBµV to 54dBµV
UHF Range	-	0dBmV to 50dBmV	0dBmV to 50dBmV
Test Type	PRPD – PD pattern, analysis	PRPD – PD pattern, wave shape analysis DeCIFerTM	PRPD – PD pattern, wave shape analysis DeCIFerTM
Data Acquisition			
Signal sampling	Peak Hold&320k Samples/sec, 10 bit	100MSamples/sec, 14 bit	100MSamples/sec, 14 bit
PD Analysis	Automatic	Automatic	Automatic
Reporting	Website or standalone	Website or local	Website or local
Data Analysis			
PD Wave Shape	No	yes	yes
PRPD View	Yes	Yes	Yes
Trending Data	Yes	Yes	Yes
Reports	Yes	Yes	Yes
Alarms	Emails, SCADA, SMS	Emails, SCADA, SMS	Emails, SCADA, SMS
Operating Environment			
Temperature	-20°C to 60°C	0°C to 50°C	0°C to 50°C
Humidity	≤90% RH non-condensing	20 to 90% RH noncondensing	20 to 90% RH noncondensing
IP Rating	IP 54 standard IP 68 optional	IP 54	IP 54 standard IP 68 optional
Power			
Rated Voltage	100 to 250 VAC	100 to 250 VAC	100 to 250 VAC
Frequency	47Hz to 63Hz	47Hz to 63Hz	47Hz to 63Hz
Safety and EMC	CE-compliant in accordance with Low Voltage Directive (2014/35/EU) and EMC Directive (2014/30/EU)	CE-compliant in accordance with Low Voltage Directive (2014/35/EU) and EMC Directive (2014/30/EU)	CE-compliant in accordance with Low Voltage Directive (2014/35/EU) and EMC Directive (2014/30/EU)
Designed and manufactured in the United Kingdom			

	ASM-Remote	ASM-Central
Number of Channels		
Number of Channels	Up to 20	Up to 128
Spike Protection	Yes	Yes
PD Monitoring		
Sensor Types	HFCT for cable PD CC for TEV local PD AA for ultrasonic, surface tracking UHF for GIS PD Detection	HFCT for cable PD CC for TEV local PD AA for ultrasonic, surface tracking UHF for GIS PD Detection
Cable PD Range	10pC to 1,000,000pC+	10pC to 1,000,000pC+
TEV Range	0dBmV to 60dBmV	0dBmV to 60dBmV
Acoustic Range	-6dBµV to 54dBµV	-6dBµV to 54dBµV
UHF Range	0dBmV to 50dBmV	0dBmV to 50dBmV
Test Type	PRPD – PD pattern, wave shape analysis DeCIFerTM	PRPD – PD pattern, wave shape analysis DeCIFerTM
Data Acquisition		
Signal sampling	100MSamples/sec, 14 bit	100MSamples/sec, 14 bit
PD Analysis	Automatic	Automatic
Reporting	Website or local	Website or local
Data Analysis		
PD Wave Shape	Yes	Yes
PRPD View	Yes	Yes
Trending Data	Yes	Yes
Reports	Yes	Yes
Alarms	Emails, SCADA, SMS	Emails, SCADA, SMS
Operating Environment		
Temperature	0°C to 50°C	0°C to 50°C
Humidity	20 to 90% RH non-condensing	20 to 90% RH non-condensing
IP Rating	IP 54 standard IP 68 optional	IP 54 standard IP 68 optional
Power		
Rated Voltage	100 to 250 VAC	100 to 250 VAC
Frequency	47Hz to 63Hz	47Hz to 63Hz
Safety and EMC	CE-compliant in accordance with Low Voltage Directive (2014/35/EU) and EMC Directive (2014/30/EU)	CE-compliant in accordance with Low Voltage Directive (2014/35/EU) and EMC Directive (2014/30/EU)
Designed and manufactured in the United Kingdom		