

PD SG1

A revolution in portable PD locators



The most precise portable PD locator in the World

- Locates PD source with a resolution of 10cm
- Power Cycle technology enables distinction between electrical noise and PD
- Improves personnel safety with fast, accurate PD location



IPEC's PD SG1 Portable Partial Discharge Detector is a revolution in the detection of PD in switchgear and other sub-station equipment.



The PD SG1 is the world's most effective portable PD locator. It's designed to save valuable time and resources in locating potential failure points by making it possible to:

- pinpoint the source of PD activity to within 10cm
- distinguish between electrical noise and PD

The PD SG1 is also highly reliable and very easy to use.

If you would like to loan a PD SG1 or to request a demonstration [please call us on +44 \(0\)161 226 0045](tel:+44201612260045)

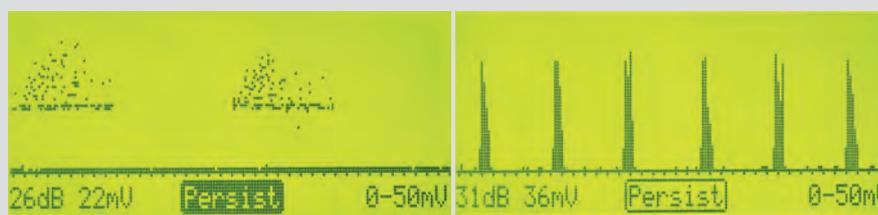
Simple and quick location of PD to within 10cm



- Two Capacitive Coupler PD sensors for detecting TEV signals
- Sub nano-second 'precedence detection' for accurate PD location to within 10cm
- PD magnitude displayed in dB or mV
- 'Live' phase resolved oscilloscope display for PD pattern analysis
- Bright LCD panel display for indoor and outdoor use
- Easy to use touch sensitive buttons

Distinguishing PD from Noise in an instant

Cycle mode clearly identifies PD in the power cycle providing an instant method of distinguishing PD from noise.



PD in the power cycle

Noise

Why choose IPECs PD SG1

Over 80% of disruptive substation failure can be pre-detected through Partial Discharge monitoring. However, many power companies use sub-standard monitoring equipment. IPEC's PD SG1 is an extremely powerful PD monitoring device. It is the only portable PD detection system in the world that can distinguish clearly between electrical noise and PD and pinpoint PD so accurately.

The benefits of this are:

- less time needed to identify the source, reducing maintenance costs
- less costly as PD is located accurately removing the need for unnecessary testing and part replacements
- quicker resolution and therefore reduced risk of power failure and less risk to test engineers

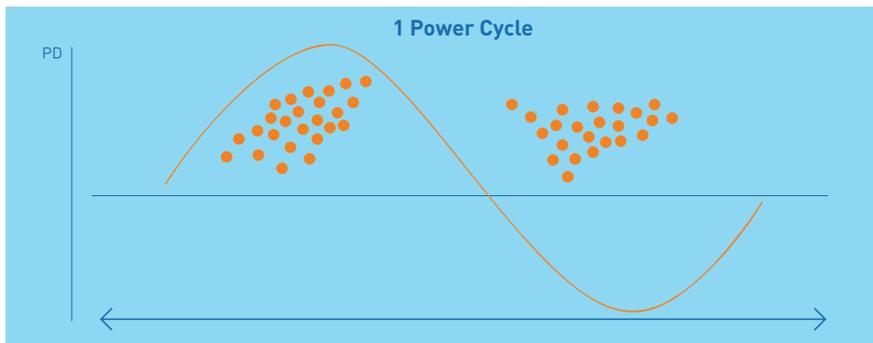
Please see the inside back cover for a comparison with the more expensive market leading competitor.

Partial Discharge and Noise: the problem and the solution

The Problem: Partial Discharge (PD) is a localised breakdown of a small portion of a solid insulation system under high voltage stress. Once begun, PD causes progressive deterioration of insulating materials, ultimately leading to complete failure. Therefore it is critical to be able to identify the PD source so it can be fixed quickly. However one of the greatest problems in identifying PD is how you distinguish the discharge activity from the general electrical noise which is very often present in sub stations and switchgear.

The solution: The pulses caused by each discharge are distributed across the AC power cycle with a distinctive pattern. By plotting the peak of each pulse detected, the PD SG1 displays a pattern that can be used to distinguish between genuine Partial Discharge activity and signals from electrical noise interference.

The PD SG1 is the only portable PD monitor that has this feature.



IPEC: A World leader in Partial Discharge monitoring

IPEC is renowned for its high level PD monitoring equipment and data analysis software used by utility companies and industry throughout the world.

IPEC has now developed this cutting edge technology into portable PD monitoring equipment with the launch of the PD SG1 which is designed to be used on high voltage plant including switchgear, VTs, CTs and cables. The PD SG1 is set to revolutionise this market with its unique features.



PD-Eye on the wall



Precise PD: The most advanced PD detection, monitoring and analysis system

PD SG1 Features

- PD magnitude displayed in dB or mV
- Sub nano-second 'precedence detection' for accurate PD location
- 'Live' phase resolved oscilloscope display for PD pattern analysis
- Two Capacitive Coupler PD sensors for detecting TEV signals
- PD SG1 Magnetic Field Detector automatically synchronises system to the power cycle
- Airborne acoustic sensors for detecting tracking corona
- Bright LCD panel display
- Easy to use touch sensitive buttons
- Very sensitive
- Audio output (headphones supplied)
- Approximate dimensions 80 x 130 x 180 mm
- Long battery life
- Heavy duty casing for high level protection

For specifications please see page 6.

Level Mode

In Level Mode, the magnitude and the repetition rate of the PD are displayed.

PD type	Sensor	Unit
Internal switchgear PD	CC	dBmV
Surface discharge	AA	dB μ V
Cable PD	HFCT	pC

The maximum PD detected is shown on the display. The reading can be restarted at any time by selecting 'Reset'. The repetition rate or the 'Count' shows a measure of the number of PD detected per power cycle.

Precedence Mode

Precedence Mode is used to locate the originating source of the PD activity. The display shows which sensor is closest to the source by comparing the arrival time of pulses detected on the left and right channels. As the sensors are moved around the equipment under test, the LCD display shows graphically the ratio of pulses detected on each channel. The precedent channel is also indicated with a Left and a Right LED and acoustically via the stereo headphones.

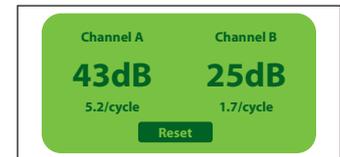
Cycle Mode

In Cycle Mode the system shows the PD activity in a phase resolved display (ϕ .q) that is synchronised with the power cycle. A magnetic field detector synchronises the PD-SG1 with the current in a cable or bus bar that it is placed near. The display can be set to show the activity live and constantly updated or it can be set to infinite persistence where an image is built up showing the distribution in the power cycle.

Three modes of operation

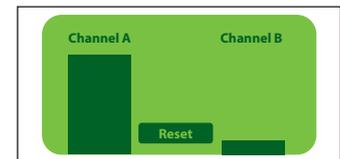
PD level mode

Both a numerical and a graphical display of the size of the detected discharge in mV or dB. A 'Count' display shows the intensity of the activity in pulses per power cycle.



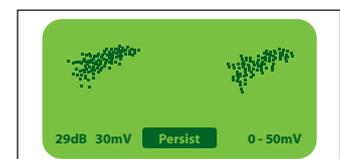
PD precedence mode

Determines which sensor detected the PD first so that the source can be easily and accurately identified to within 100mm by moving the sensors around the plant under test.



Cycle mode

Live graphical representation of the discharge activity in the power cycle. Patterns can be compared to distinguish PD from electrical noise interference as signals are synchronised to the HV power cycle.



Equipment



The PD-SG1 is supplied in a rugged and waterproof Pelican™ Case with a lifetime guarantee.

PD SG1

The PD-SG1 is housed in a bespoke aluminium enclosure with rubber protective coverings on either side for a high level of durability. A strap allows it to be worn around the neck and hang down on the chest. The sensor connections are on either side.



The screen

A bright monochrome LCD display shows text and graphical information in a clear and simple format for ease of use. Four membrane switches on the front of the PD SG1 control the functions.



The Field Sensor

The magnetic field sensor and synchroniser is packaged in an aluminium casing with indicator light on the front.



Sensors

HFCT for cable PD Detection
2 x CC Sensors
1 x AA Sensor



Headphones

High quality industrial headphones are included for the audio output.



Power

The unit will be powered by a lithium-ion battery giving a life of approx. 12 hours of use. The PD SG1 comes with a charging unit. The software has intelligent power management with automated shutdown if the device is not used for a period of time.

Cables

1 x 2m BNC-BNC RG58 coax
1 x 4m BNC-BNC RG58 coax
2 x 1m SMA-BNC coax
2 x 2m SMA-BNC coax

Documents

Manual
PD pattern look up chart
Calibration certificate

Specification

Switchgear TEV	
Sensor	Capacitive Coupler (CC)
Detection Range	0 - 83dB
Accuracy	±1dB
Ultrasonic	
Sensor	Airborne Acoustic (AA)
Amplifier Gain	80dB
Transducer Sensitivity	-65dB (0dB=1V/μB)
Frequency	40kHz
Cable PD	
Sensor	High Frequency CT (HFCT)
Detection Range	0 - 2,000,000pC
HFCT Transfer Function	5.0V/A
Frequency	50kHz - 20MHz
Precedence	
Time resolution	300ps
Distance resolution	100mm
Power Cycle	
Frequency	50/60Hz
Display Modes	Live & Infinite Persistence
Linear Range	Min 0 - 20mV Max 0 - 14V
dB Range	0 - 83dBmV
Hardware	
Enclosure	Tough aluminium case with rubber protective side panels
Display	Backlit LCD with precedence LEDs
Controls	Membrane keys Volume control potentiometer
Size (w x h x d)mm	210 x 110 x 210
Power	
Battery type	Lithium-ion
Battery life	Approx. 12hrs
Power Management	Auto-switch off
Battery Charger	100-250VAC 50/60Hz
Environmental	
Operating Temperature	0 - 55 C
Humidity	0 - 90% RH non-condensing
IP Rating	60





Comparison with UltraTEV Locator

UltraTEV Locator, from EA Technology is the closest competitive product in terms of functionality and cost.

Feature	UltraTEV Locator	PD-SG1
TEV measurement	Range 0-60dB Resolution 1dB Minimum pulse rate 10Hz System can be used in one channel mode or two channel mode	0-80dB Resolution 1dB No minimum pulse rate System is always in two channel mode
Precedence Mode	Precedence is indicated by a simple 'First' indication The detection resolution is 60cm	Precedence is indicated by an LED (left or right) and a bar chart on the LCD showing the statistical level of precedence in a user settable buffer The detection resolution is less than 10 cm
Cycle Mode	There is no cycle mode	Display shows the detected activity distributed across the power cycle This function allows the user to see if the activity has a PD pattern or is just noise.
Ultrasonic	Measurement Range -7dB μ V to 68 dB μ V	Measurement Range -7dB μ V to 68 dB μ V
Screen	'High' resolution Colour touch screen	Monochrome with Membrane buttons next to screen
Power	Battery with intelligent power saving	Battery with intelligent power saving

PD SG1

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IPEC : Award winning innovation for power engineering

Independent Power Engineering Consultants (IPEC) was founded in 1994 with the objective of transferring cutting edge technology to the power industry through a unique collaboration of academic research and expertise in power engineering. This has enabled the power industry not only to fully exploit the research and innovation of scientists at the forefront of power engineering, but to make an active contribution to the direction of future research and development. In turn, IPEC has been able to respond efficiently to market demands and develop highly advanced products which bring real monitoring and control solutions to the power industry.

Working in close collaboration with clients, IPEC provides a complete service for the design, manufacture and support of power engineering monitoring systems. IPEC has cultivated and maintained long-term working relationships with many major power and industrial companies ensuring both an on-going understanding of market requirements and a continuity and consistency of service. These clients include: **UK Power Networks (formerly EDF Energy Networks), BP, E.ON, Network Rail, Electricite de Strasbourg, Freescale Semiconductor, EDF, NRM, EnBW, Demasz, Western Power, Dubai Electricity and Water Authority, LG Chemical, China Steel Corporation, Taiwan Power Company.**

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