Megger

GIS*monitor*

技术咨询和询价：010-68940148

Continuous on-line partial discharge monitoring of gas-insulated switchgear

EN
ENGLISH

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Protect your essential assets

PARTIAL DISCHARGES IN GIS

Knowing the condition of your asset is vital

PD monitoring helps in extending asset life cycles

Gas-insulated switchgear (GIS) is an essential part of transmission installations and of critical systems such as power plants and large industrial consumers. They are among the most valuable assets to provide reliable electric power and, hence, their constant availability should be ensured by preventing failures and interruption of service.

Potential reasons for defects in GIS systems are errors during manufacturing, transport, and on-site assembly, which can be detected by high voltage (HV) tests before commissioning, as recommended by CIGRE. Another reason for defects is aging of the insulation system over time. If undetected, it also can lead to breakdowns and costly outages.

Common causes for failures in GIS are:

- Voids and cracks in solid insulating materials
- Floating or loose electrodes
- Free moving particles
- Particles or protrusions on the high voltage conductor or the enclosure
- Fixed particles on insulating materials

Particles and foreign bodies are the most common cause of insulation failure. They produce Partial Discharge (PD), which causes deterioration of the insulation materials and results in insulation breakdown.

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FAILURE PREVENTION

Eight good reasons for PD monitoring

Continuous on-line PD monitoring on GIS using ultra-high frequency (UHF) measurements is an essential part of any electrical condition monitoring program to prevent unplanned outages due to defects in the insulation system of a GIS.

1

FORWARD-LOOKING

Early, reliable defect detection before fatal breakdown

2

PREVENTION

Prevention of unplanned outages

3

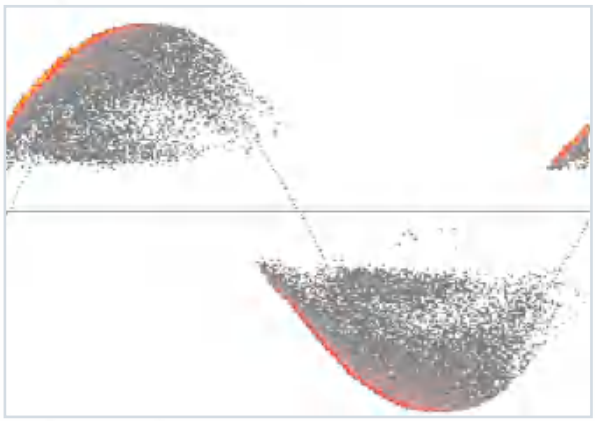
RELIABILITY

Improvement of the asset's reliability

4

AVAILABILITY

Increase of the asset's availability



PD MONITORING ON GIS REDUCES THE FAILURE RATE BY EARLY DETECTION OF DEFECTS AND PREVENTS COSTLY OUTAGES.

Those failures can cost millions in loss of income or equipment replacement. PD monitoring on GIS provides an early warning indicator of incipient faults and crucial data for condition-based maintenance.

5 **FORECAST**

Trending information for scheduling necessary maintenance work in time

6 **TRANSPARENCY**

Storing all data on all channels offers transparent results for in-depth analysis

7 **EFFECTIVITY**

Moving from time-based maintenance to efficient condition-based maintenance

8 **SAVINGS**

Reduces maintenance costs

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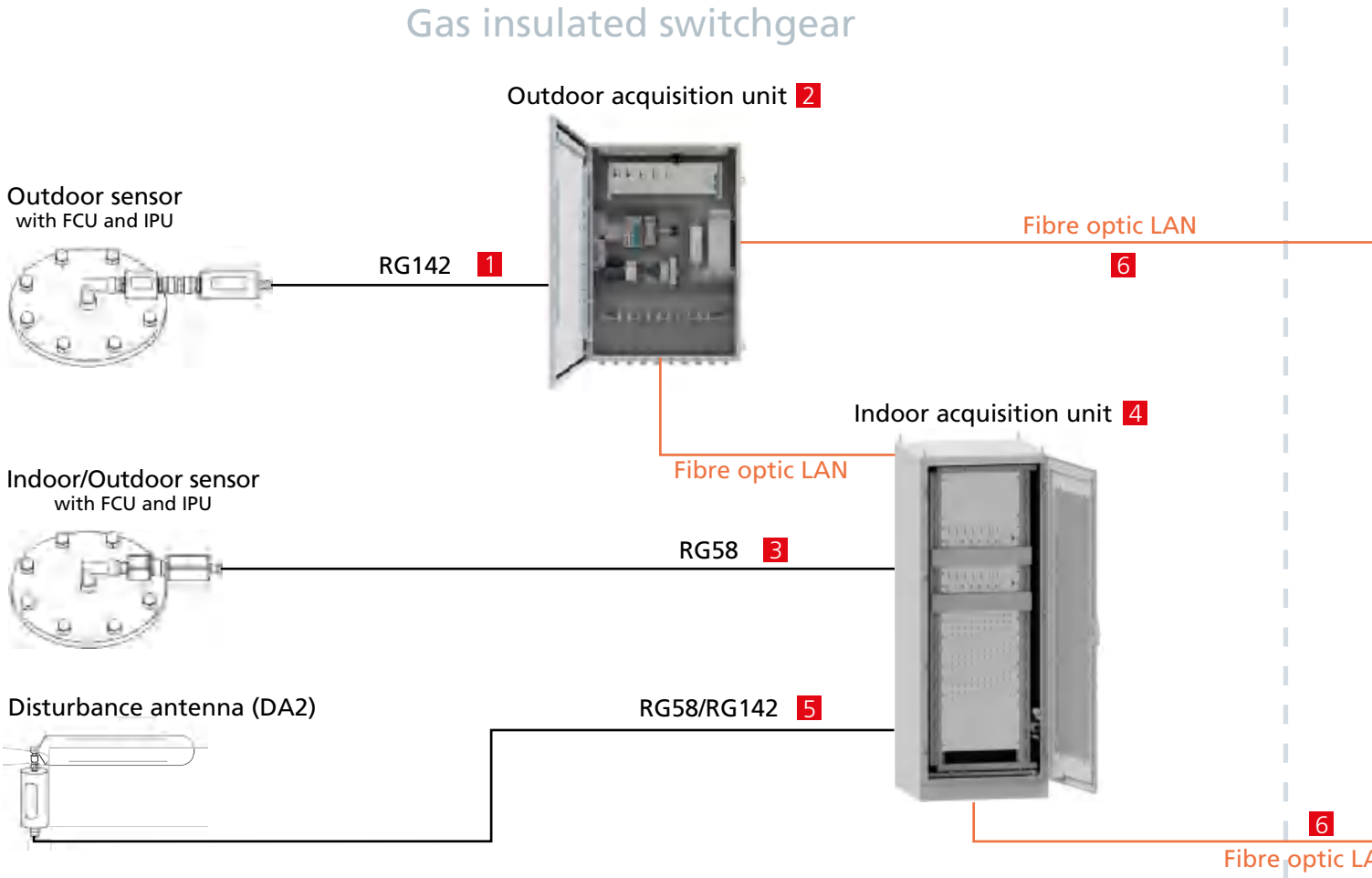
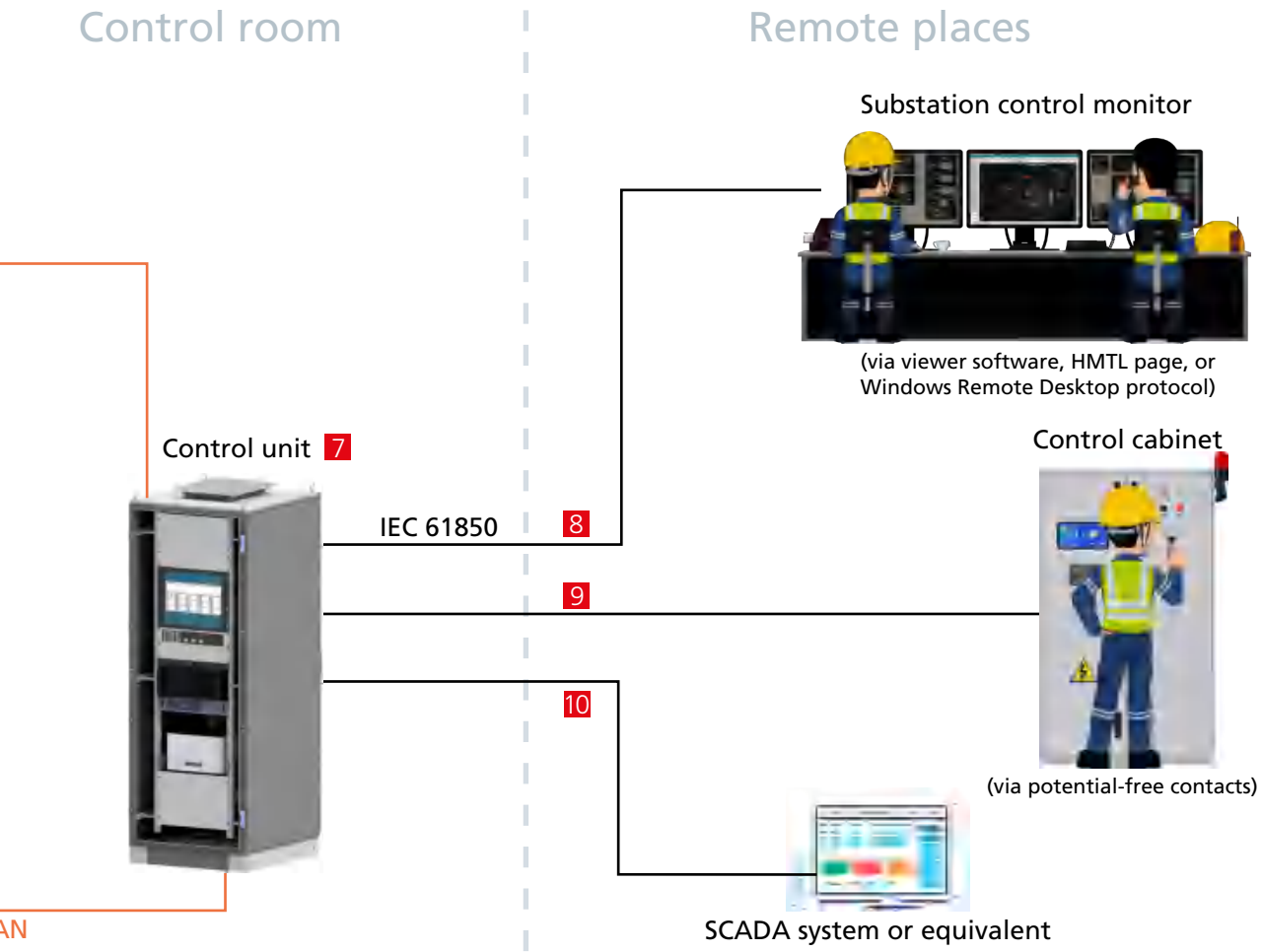


MONITORNG SYSTEM

Overview

Permanent PD monitoring allows you to assess the health of an insulation system, offering a good insight into the GIS by using non-invasive measurement and analysis methods. Power Diagnostix helps customers to improve the reliability of their systems by implementing partial discharge monitoring that leads to optimised maintenance and investment planning based on asset condition. The collected monitoring data of Power Diagnostix's PD Monitoring System (PDMS) for GIS allows the identification of different types of defects and gives reliable trending information. This information supports asset managers in making strategic decisions regarding the repair or replacement of equipment before an unexpected outage occurs.



1 PD signal from an outdoor UHF sensor converted by a Frequency Converter Unit (FCU) with Input Protection Unit (IPU) connected via coaxial cable RG142 to an outdoor Partial Discharge Monitoring Acquisition Rack (PDMAR)

2 Outdoor PDMAR for real-time acquisition of up to 40 PD signals in parallel

3 Signal from an indoor/outdoor UHF sensor converted by an FCU with IPU connected via coaxial cable RG58/RG142 to an indoor PDMAR

4 Indoor PDMAR for real-time acquisition of up to 120 PD signals in parallel

5 Gating signal from an optional disturbance antenna (DA2) via coaxial cable RG58 or RG142 to a PDMAR

6 Fibre optic ring structure for signal transmission from the PDMAR to the Partial Discharge Monitoring Control Rack (PDMCR) via redundant fibre optic cables

7 PDMCR with control software and printer

8 Remote control of the PDMCR with PC via optional IEC 61850 interface to a substation control room

9 Alarm forwarding with potential-free relays

10 Data transmission and alarm forwarding to a SCADA system through IEC 61850 interface, RJ 45, or PRP fibre optic.

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PD on-line monitoring according to industry standards

Power Diagnostix's state-of-the-art partial discharge monitoring system was designed based on our GIS expertise and the requirements of our customers. It ensures a continuous and automated analysis of the insulation condition by utilising ultra-high frequency measurement on up to several hundred sensors at frequencies up to some gigahertz.

UHF measurements have a high immunity to interference. They detect PD activity at frequencies above common disturbances and provide a high sensitivity during on-line conditions.

In environments with background noise even in the UHF bandwidth, a disturbance antenna with a wideband characteristic can filter frequency signals, e.g., emitted by cellular or GSM transmitting antennas.

KEY FEATURES

- Non-intrusive defect detection
- Automatic expert data processing and PD warnings
- Scalability, from 8 to over 500 sensors per PDMS
- Parallel real-time PD acquisition on all channels
- Effective noise suppression
- Remote or on-site control
- System redundancy to guarantee highest availability
- Suitable for indoor and outdoor
- Retrofitting of most major GIS systems possible
- High quality instruments made in Germany

Your benefits

Highly accurate information on asset condition, reducing costs by condition-based, instead of time based maintenance

Early warnings of possible failure, so that corrective actions can be taken before any failure occurs

Risk management of previously undetected faults and avoiding costly damage to equipment

Retrofits to most GIS systems by using existing antennas that are already built-in or by using external retrofit sensors

Cost savings thanks to a centralised PDMS design allowing the installation of a relatively small number of acquisition units and the reduction of commissioning costs

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Partial discharge monitoring acquisition rack (PDMAR)

The acquisition unit has been optimised for parallel, real-time PD acquisition on multiple channels. Any UHF signal can be detected and digitised within microseconds. The system is fully compatible with the built-in UHF sensors on the most recent GIS.

Indoor cabinets feature a protection class of IP54, while outdoor cabinets reach a protection class of IP65. Each cabinet comes with a 19-inch swing frame, uninterruptible power supply, network switch, overvoltage protection, temperature-controlled fans (or a heating and cooling Peltier element), and ioLogic technology providing information about temperature, heating, cooling, the fibre optic ring status, fuse status, and overvoltage protection. If necessary, the outdoor cabinets can be equipped with a sun protection.

Thanks to the redundant nature of the fibre optic ring network that connects the cabinets, data loss is easily avoided.

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Customised to client-specific needs

Partial discharge monitoring control rack (PDMCR)

The high-performance control cabinet accommodates an industrial PC (IPC) with a RAID-1 hard disc controller to prevent unwanted loss of data. The HDD capacity allows the storage of trending and PD patterns for several years. The GIS*monitor* software can be used via a modern touchscreen. Reports, screenshots, or single measurements can be printed with the built-in printer.

FACTS AND FIGURES

The following figures speak for themselves:

Over 25
YEARS OF EXPERIENCE

Over 35
SATISFIED CUSTOMERS

Over 150
SYSTEMS SOLD WORLDWIDE

Over 20 000
CHANNELS SOLD

EXTERNAL UHF SENSORS

Convenient retrofitting with PDIX sensors

Cost-effective alternative to built-in sensors

PDIX offers external retrofit sensors for older GIS that were not equipped with built-in PD sensors by the manufacturer. An external sensor is often less sensitive than the built-in, but it can be fitted to the GIS at marginal costs and whilst the equipment is on-line.

Furthermore, it's possible to retrofit a GIS with PD sensors by modifying internal components, such as embedded electrodes for the control of the electrical field.

Window sensors

Convenient retrofitting of older GIS with UHF monitoring by using the inspection windows

External flange sensors

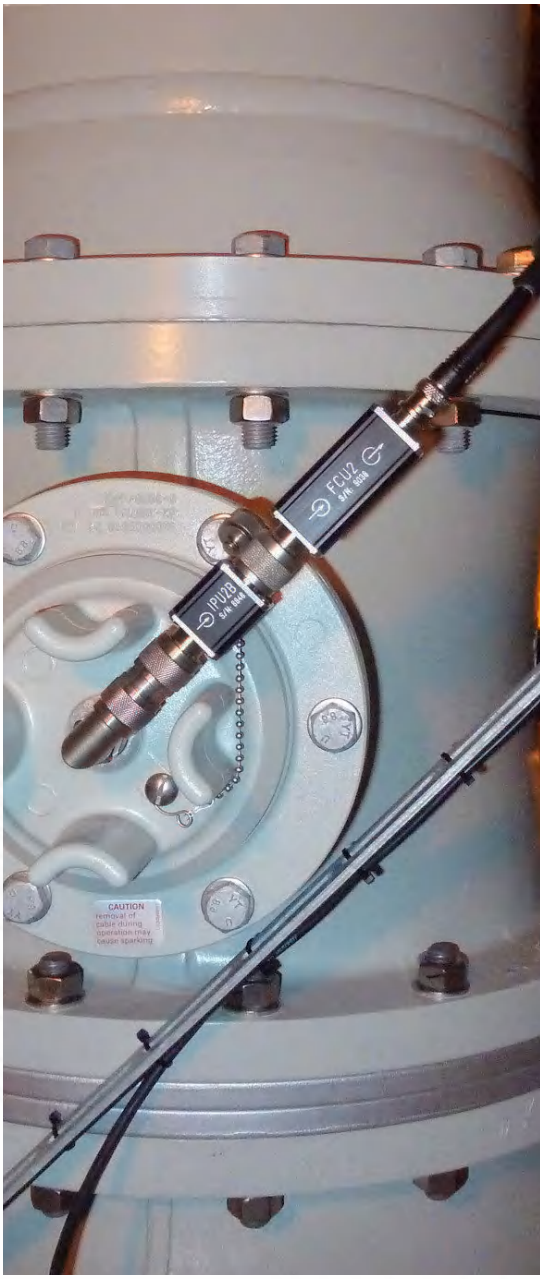
Wide-band UHF antenna for permanent or temporary installation

Adapters for embedded electrodes

Extracts UHF signals picked up by electrodes that are located inside section insulators

Frequency converters and input protections

Transforms UHF signals into lower frequencies and protects the equipment against very strong transient signals



ENHANCED TECHNIQUES

Prevention of false alarms through effective noise handling

Data transmission via fibre optic cable

Fibre optic connections have been proven to be very reliable in industrial environments, because they are less prone to strong interference signals typically coming from machines and electrical discharges.

Further advantages are:

- Galvanic isolation for excellent signal-to-noise ratio
- Long distance cabling without reducing the performance of the monitoring system
- Precise synchronicity of all connected cabinets, ensuring accurate measurement results even under demanding environmental conditions

Noise suppression without loss of relevant data

Interferences caused by other high voltage equipment nearby can make PD measurements and analysis very difficult, so reduction/ elimination of such interference signals is essential for accurate and reliable measurement results. Thanks to its communication via optical fibres and its robust design Power Diagnotix's PDMS for GIS has excellent immunity to noise caused by events such as switching operations. Fibre optic data transmission assures a very good signal-to-noise ratio.

Additionally, Power Diagnostix's GIS*monitor* features an effective noise handling technique that ensures excellent measurement results even under difficult environmental conditions.

The monitoring software can be connected to a disturbance antenna to sense and remove noise without losing significant PD data.

The wideband antenna DA2 consists of a UHF antenna and a frequency converter unit. It is designed to pick up and filter high frequency signals, e.g., those emitted by cellular and GSM transmitting antennas.

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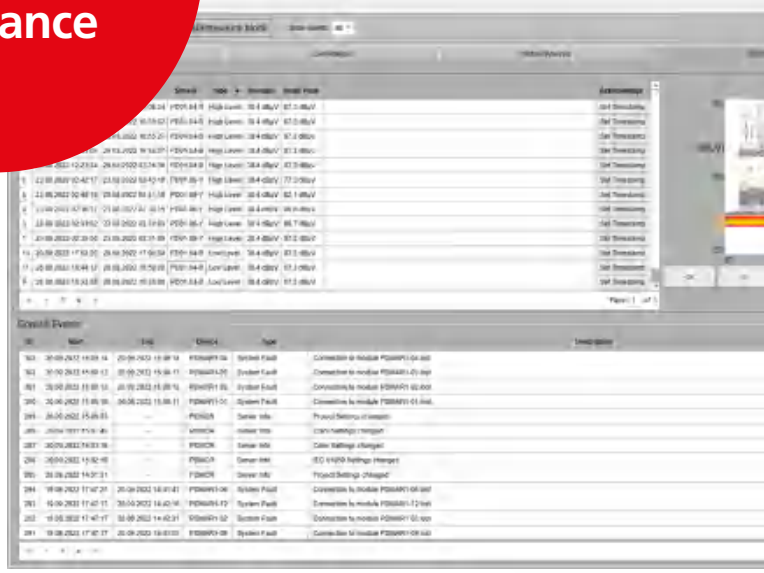
Real-time information at a glance

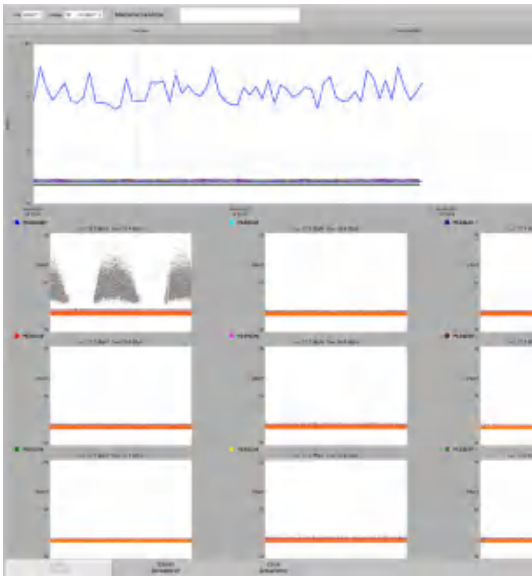


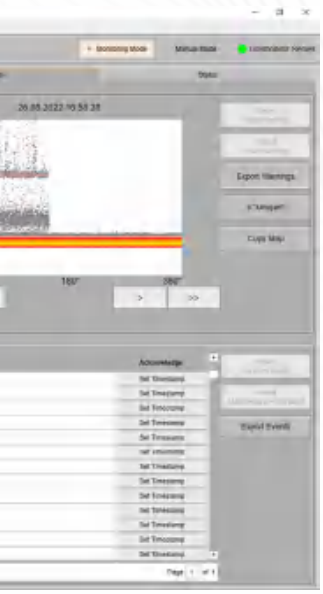
INTELLIGENT DATA HANDLING

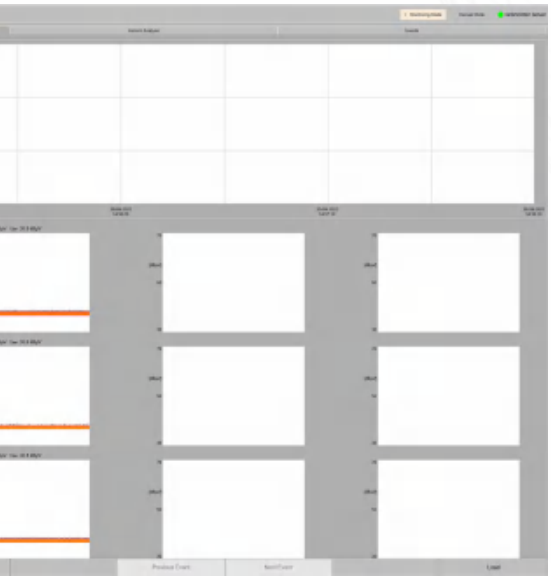
Display modes for monitoring, in-depth analysis, and maintenance

Expert signal processing for informative results

The GIS*monitor* control software is installed on the industrial PC of the PDMCR and can be additionally installed on any remote computer for remote data evaluation, diagnosis, and configuration. The graphical user interface is customised for each GIS system and provides a user-friendly overview of the current system status.







The service software visualises the current readings of the installed PD sensors and indicates partial discharge events or system notifications. It features analysis and reporting functions, such as the display of trending information and phase-resolved PD patterns as well as automatic report generation.

Alarms and trending

The alarm event list indicates peak levels, PD patterns, and trending information. PD trending and PD pattern data are automatically stored and available for the complete monitoring time.

Extended possibilities with ICM*expert*

The ICM*expert* database with integrated PD failure database and extensive PD pattern library offers automatic PD fault classification.

Unique HV test panel

The HV test panel can be used to create a fingerprint-like PD profile of the GIS when it is finally energised. This profile can serve as an all-time reference.

Integration into substation control systems

Thanks to its interfaces to third-party control systems, such as SCADA, IEC 61850, and others, data in the GIS*monitor* software can be easily integrated into larger substation control systems.

Support and Services

Power Diagnostix provides a full-service for continuous on-line monitoring on GIS, from planning and customised recommendations, such as, which set-up works best for your application, to system installation and commissioning. Our expert team of experienced PD specialists can help analyse PD data from the GIS*monitor* and provide reports as well as recommendations and is on hand in case of alarms. Our services are accredited to ISO 17025:2018, ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018.

We assure long-term serviceability, upgrade options, and spare parts supply for all of our monitoring systems.

TAYLOR-MADE SOLUTIONS

For an optimal customer satisfaction

Questionnaire for best customer care right from the start

Each of our PD monitoring systems is a tailor-made solution that fits exactly to your specific requirements. Get in touch with us for a detailed quotation at support.pdix@megger.com.

In order to optimally adapt our system to your specific needs, we need some technical information regarding the GIS and the embedded UHF sensors. For this purpose, we have designed a pre-quotation questionnaire and made it available for you to download.

Questionnaire
as Word document

Questionnaire
as PDF file

Power Diagnostix Systems GmbH have been providing quality instruments and engineering services for high voltage diagnostic applications since early 1993.

Our digital partial discharge monitoring systems are used for evaluation of electrical insulation by electric utilities, manufacturers, and research institutes worldwide. We help utility and industrial customers to improve transmission, distribution, and substation systems reliability by implementing partial discharge monitoring that leads to optimised maintenance and investment planning based on asset condition.

Power Diagnostix manufactures its innovative measurement and monitoring devices as well as corresponding accessories (sensors, coupling units, software for data collection, analysis, and diagnostics) in Aachen, Germany. With our equipment customers benefit from over 25 years of experience in partial discharge measurements.

In June 2019, Power Diagnostix became a part of the Megger group.

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