GLOBAL MONITORING for GIS

ALTANOVA
GROUP
Advanced testing and monitoring solutions

TECHIMP

isa

Fully Integrated Permanent GIS Monitoring System

One system for global GIS condition monitoring

- Partial Discharge activity
- Circuit Breaker operation: open/close time, movement, velocity
- Open and close coil currents: profiles and peaks
- I2t sum and maintenance threshold
- Fault currents
- Motor and heater currents
- SF6 density and leakage monitoring
- Battery Voltage

Preventing failure of GIS is vital

EDS-GIS monitoring system helps our clients to prevent major faults and malfunctioning in both HV and EHV GIS.

GIS faults are a result of:

- Errors in manufacturing
- Shipping damages
- Assembly errors
- Ingress of moisture
- Gas SF6 leakages
- Circuit Breaker malfunctions
- Battery malfunction
- Motor malfunction

Typical defects that generate harmful PD

- Moving particles
- Electrode protrusions/scratches
- Fixed particles on insulating surfaces
- Floating (or loose) electrodes (stress shields)
- Voids in solid insulation.

EDS-GIS at a glance

EDS-GIS permanently monitors the PD activity and also all other fundamental parameters in GIS circuit breakers. It is a modular system that includes:

- **EDS acquisition unit** to monitor all CB functions
- **PD Hub and Cabinet** including the PD Scope Acquisition unit
- **A large variety of sensors,** such as: PD sensors (internal couplers or external UHF), SF6 sensors, current transducers, digital transducers for CB velocity
- **A Central Unit with monitoring software TiSCADA** that shows real time data (PD in the GIS and data of the circuit breaker), trends and current profiles and allows data analysis

EDS-GIS system has modular and flexible architecture that allows to design the global monitoring system according to our customer requirements.
EDS-GIS retrofits to most of major GIS brands.

Main functions of EDS-GIS monitoring system

Continuous PD Detection

The EDS-GIS monitoring system continuously monitor the PD activity in the GIS using Altanova Techimp state of the art technology and patented T/F map noise rejection. The system is configurable in order to reject noise and to acquire only partial discharge signal for the alarm evaluation. It is also possible to discriminate different type of phenomena, and assign to them different alarm algorithms with different thresholds.
Data can be visualized as PRPD standard pattern (with multiple selection for comparison) as well as T/F map. Statistical parameters such as Qmax, Nw (and more) are also provided for each acquisition.
Advanced PD processing and identification is possible through an additional software application.

- Continuous PD monitoring and detection improve system reliability and reduce failure risks
- High resolution system
- Automatic Alarms based on PD trends and phenomena
- Automatic noise rejection based on patented T/F Map

Continuous Circuit Breaker Monitoring Functions

- Opening and Closing times
- Open and Close Coil currents (and peaks)
- Fault current profiles (and peaks)
- Breaker velocity
- Motor and heater current
- SF6 instantaneous pressure
- SF6 leakage with trend analysis and alarm prediction
- I2t sum (dissipated energy)

GIS Monitoring System Components

PD Hub and cabinet

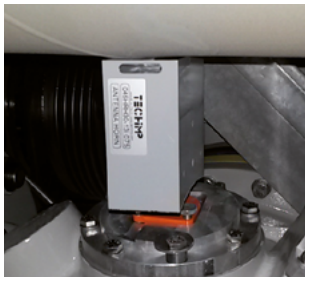
The Acquisition Box is the core of the PD monitoring system.
It collects the Partial Discharge signals coming from the internal or external UHF PD sensors.
The PDScope is the acquisition device mounted in the acquisition box. It can be connected to 3 or 6 PD sensors via coaxial cables. In a single acquisition box up to 2 PDScopes can be installed, bringing the total capacity up to 12 PD channels.

The PDScope is based on a large memory large bandwidth digitizer. It can capture the entire waveform of a large number of pulses (up to 100k). The device is able to sort different pulses with different shapes (T/F map) hence improving the signal to noise ratio and collect mainly pulses related to PD activity.

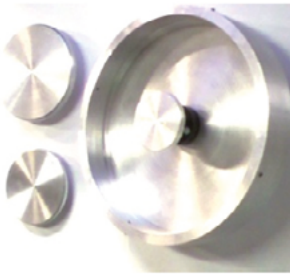
PD sensors

Altanova TECHIMP provides ONLINE PD measurements on GIS and GIL. The system requires at least one of the following:

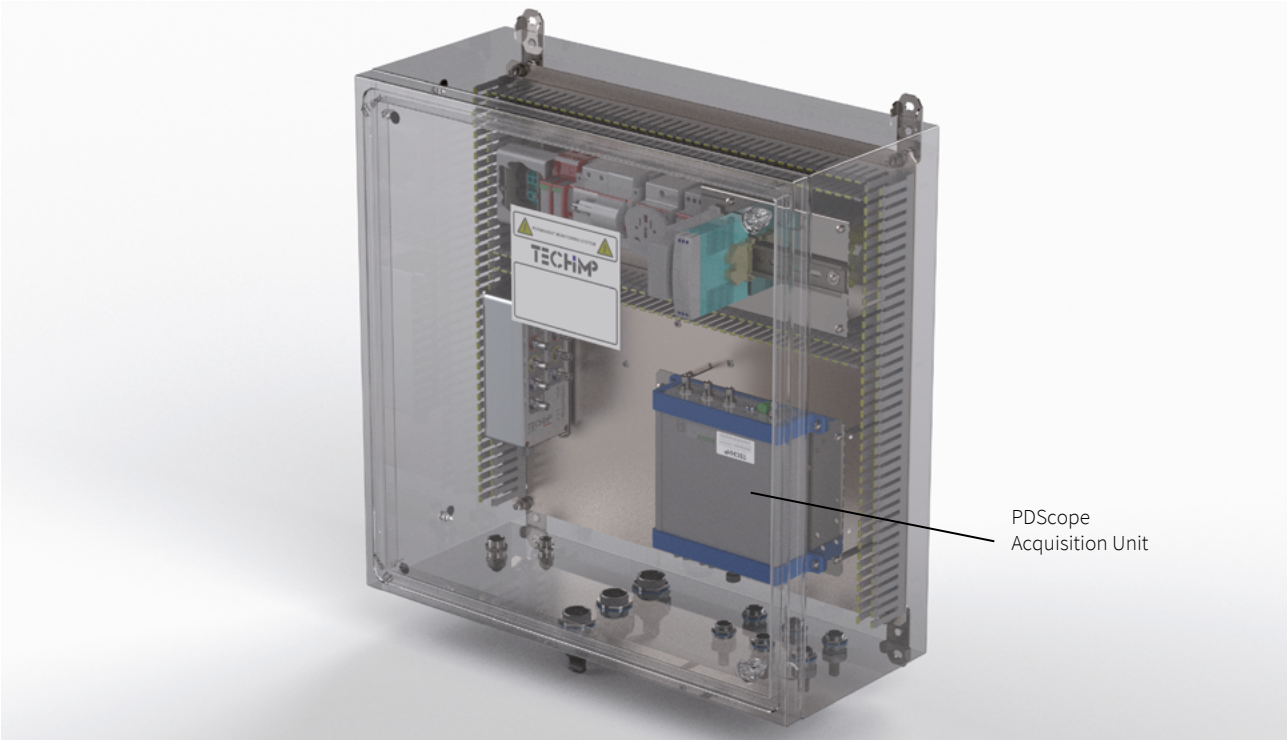
- Pre-existing internal UHF sensors (couplers)
- Unshielded epoxy spacers
- Shielded epoxy spacers with small dielectric aperture
- Unshielded epoxy spacers at cable terminations
- Circular dielectric glass windows.



External UHF sensor



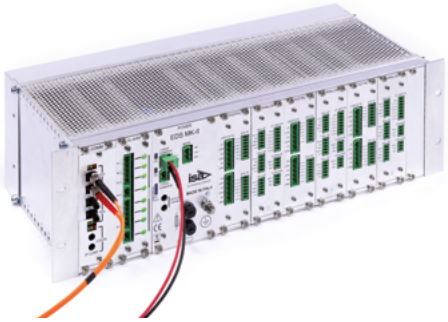
Internal UHF sensor



PD Hub and cabinet

EDS Acquisition Unit

- EDS unit and sensors have to be installed close to the CB, for example in the control cabinet of the same breaker
- EDS is a rack 19" unit and it can be configured with different modules depending the specific application
- Measurements are performed by the local acquisition unit EDS and then are sent to TiSCADA in the central unit
- Alarms thresholds and measurements can be easily defined and modified
- Current profiles of fault and coil currents are provided as standard Comtrade files, and are available through the central unit
- Measurements and alarms can be also exchanged with third party SCADA by means of standard protocols: IEC 61850, IEC 60870-5-104, DNP3 (others available on demand)



EDS Acquisition Unit

EDS Sensors

- Current Transformers/transducers for DC or AC currents
- SF6 sensors
- Digital transducers

DC Current sensor

AC Current sensor

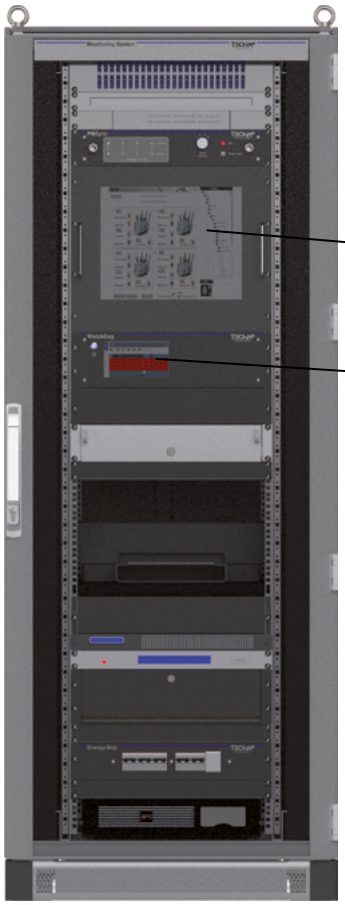
SF6 sensor

Fiber optic communication

EDS units, PD acquisition units and the central unit are connected together by means of a fiber optic network.
This network is made as a loop, in order to prevent a failure in the communication in case of interruption of one segment of fiber.
The fiber can be either single-mode or multi-mode, terminated with ST connectors.

Central Unit with monitoring software TiSCADA

The central unit is a 19" rack cabinet containing the server and the processing software.
The server is an industrial PC with redundant hard drives and power supplies, to ensure maximum reliability. The software is supplied as virtualized system (Virtual Machine), so it can be easily restored and moved to other machines.
The central unit contains also an industrial monitor and a keyboard/mouse. It can be provided with an UPS and a WatchDog unit capable to notify system alarms.



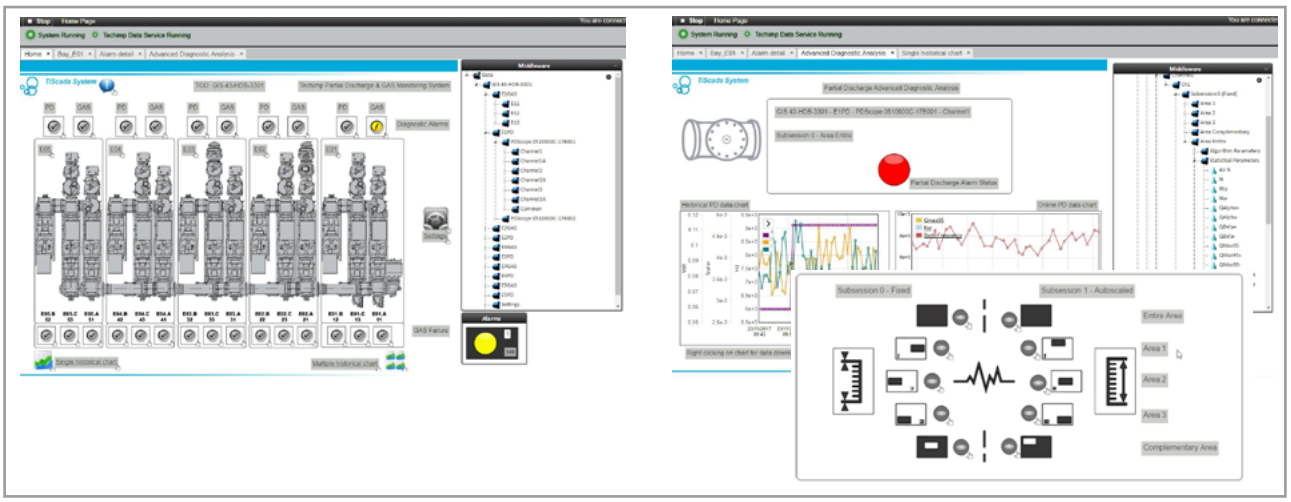
Central Unit

GLobal GIS monitoring Software TiSCADA

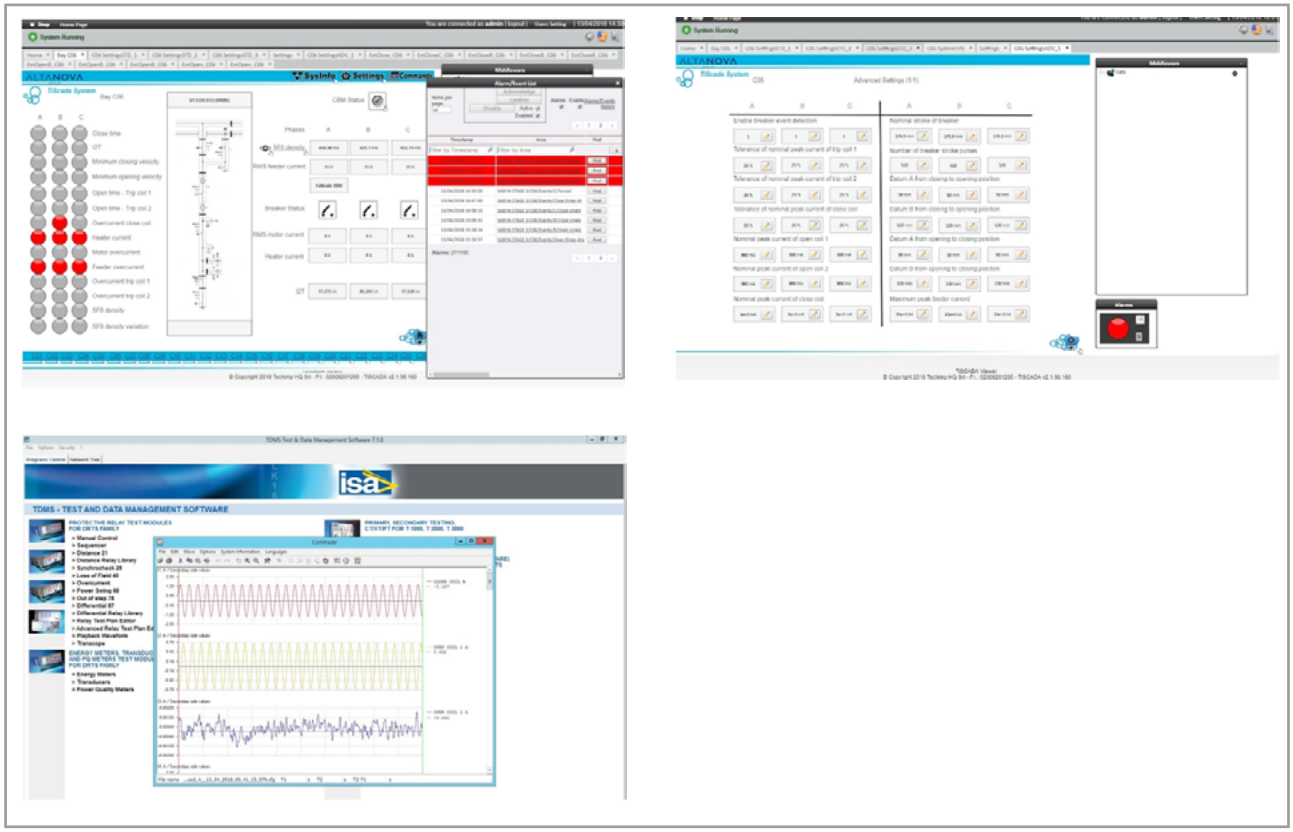
Altanova Techimp patented technology allows the different PD phenomena to be classified on the basis of their pulse shape and hence clustering on the T/F map. In such a way, further analysis can be carried out even by a non-skilled operator.
Altanova Techimp acquisition technology provides efficient noise rejection as well. Techimp classification system is successful in separating PD phenomena from those generated by disturbances.

TISCADA Complete Network Monitoring

- Trending of condition parameters
- Expandable at any time in future
- Warning signals and alarms once thresholds have been reached
- Additional services, e.g. data analysis



Data trendings



TiSCADA for CB

System Specification

PD SCOPE	
PD Channels	3 based UWB Channels (expandable to 6 or 12)
Bandwidth	16kH-30MHz, built in UWB filter (extendable to 1GHz with external Frequency Shifter, installed in the PDHub)
Resolution	10 bit
Input Impedance	50 Ohm
Recording time length	1 µs (min) 20 µs (max)
Connectors type	BNC

PD HUB	
Material	Steel, painted RAL 7035 (other colours available)
Communication	Ethernet RJ45 and/or fiber optic ST
Protection degree	IP 65
Dimensions	600x600x221mm (PDHub-3&6CH) ; 800x800x250mm (PDHub-12CH)
Weight	Approx. 35kg (PDHub-3&6CH) ; Approx 50kg (PDHub-12CH)
Power requirement	50W MAX for standard configuration ; 220VAC 50/60Hz (other on request)
Working temperature range	Standard +5°C ÷ +50°C Extended with heating option: -20° ÷ +50°C Extended with cooling option: +5°C ÷ +65°C Extended with heating and cooling option: -20°÷ +65°C

EDS	
Measured parameters	Opening and Closing times Open and Close Coil current profile Open and close coil current peak Fault current profiles Fault current peak Breaker velocity and position Motor and heater current (up to 3 phases) Battery Voltage (main and backup) SF6 instantaneous pressure SF6 leakage with trend analysis and alarm prediction I2t sum
CB connections	Terminals connected to protection relay or to duplicator cubicles / terminals
Communication and ethernet port	Fiber optic, ST type, multimode, 62.5/125µ TCP/IP communication protocol is used to transfer information to the Central Unit.
Alarms (dry contacts in the EDS unit)	Travel sensor + delay, motor current, feeder current, coil current. Optional alarms: heater current, gas density, battery voltage. The alarms listed above are cumulative alarms for each device. Details of each alarm can be provided through the HMI.
Weight	About 2 kg
Indoor installation (CB control cabinet)	EDS 1 x Rack 19” module (4U) POWER SUPPLY 1 x Rack 19” module (4U) (approximately 500x200x300mm WxHxD each module)
Outdoor installation (Optional)	400x500x 350 mm – Standard Galvanized steel cabinet IP65 Stainless steel cabinet available as option Panel size may vary to accommodate system selection
Working temperature range	Standard +5°C ÷ +50°C

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- Techimp US Corporation
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- Altanova Group GCC
- Altanova Group France & Maghreb
- Altanova Group Central America

ALTANOVA is a leading company in the field of condition based monitoring and diagnostics of electrical apparatus. ALTANOVA has its roots in two strong and long experienced companies well set in the market of testing and monitoring: ISA and TECHIMP. The merger of the two companies provides synergies for the benefit of our customers in terms of giving access to new solutions and technologies.

ALTANOVA serves customers in more than 100 countries and operates with local offices in Germany, US, India, Singapore, Brazil and U.A.E.

We provide solutions covering a wide spectrum of industrial segments such as, transmission and distribution, oil & gas, process industries, EPCs, power generation, renewables, marine and transport and OEMs.

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GMG EN - REV. 03/2019