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Power Facilities Diagnosis Hanbit EDS
We are making "best for human" & "first toward world".

Diagnostic System for Electric Power Facilities

Hanbit

01 Introduce

General Information

NAME	HanbitEDS Co.,Ltd
CEO	Ph. Dr. Jeong, Jae-Kee
Establish	14, June. 1999
Business	Total diagnosis system for power facilities Advanced diagnosis engineering services for power facilities Renewable energy Solution
Address	44-10 Techno 10-ro, Yuseong-gu, Daejeon 34027, Korea
Webpage	www.hanbiteds.co.kr

Overview

HanbitEDS Co.,Ltd was founded as the spin-off system of the Korea Electric Power Corporation in 1999, and has pursued the development of the monitoring and diagnosing systems for power equipments as its main business.

Also, we have contributing to power facility safety based on rich experience in diagnosis services for the failure of power facilities, and provide accurate diagnosis opinion for transmission, distribution and substation facilities to worldwide.

HanbitEDS Co.,Ltd will continue to maintain the highest standards and introduce innovative systems to prevent various electrical hazards.

Acquired Certification

ISO 9001 : 2008 / ISO 14001 : 2004

www.kepco.co.kr/trustedpartner

Business scope

On-line Diagnostic Monitoring System for Power facilities

- GIS Diagnostic System
  - GIS PD, Lightning Arrester,
  - Circuit Breaker, SF6 Gas
- Transformer Diagnostic System
  - D.G.A(Dissolved Gas Analysis) Tr PD
- High-Voltage Cable PD Diagnostic System

Portable On-line Diagnostic Monitoring equipment

- Portable GIS PD Diagnostic Equipment
- Portable Cable PD Diagnostic Equipment
- Portable LA Aging Diagnostic equipment
- Multi Sensor Diagnostic Equipment

Engineering Service

- Diagnosis of Electric Power Facilities (GIS, LA, SVL, High voltage Cable)
- Diagnosis and Design of Grounding System
- Diagnosis and Design of Lightning Protection

Major Customer

KEPCO · HYUNDAI HEAVY INDUSTRIES · KOGAS · KORAIL · KR KOREA RAIL NETWORK AUTHORITY · SAMSUNG HEAVY INDUSTRIES · KHNP

02 Total On-line Diagnostic Monitoring system for electric power facilities

Outline

On-line diagnostic system for GIS(Gas Insulated Switchgear), transformers, high-voltage cable and various power facilities at the substation can monitor and diagnose PD and various aging state. This system can be supplied to customer economically.

- Prevents the sudden accidents by dangerous alarm.
- More rapid response by real-time monitoring .
- lengthens the life cycle of power facilities.

System Standard Scope

| GIS Diagnostic System |

- Partial Discharge(PD) in GIS : PD diagnosis by UHF sensor.
- Lightning Arrester : Diagnosis by leakage current and counter of surge for LA.
- Circuit Breaker : Analysis the gap time difference of open/close operation and monitors SF6 gas density.

| Transformer Diagnostic System |

- PD : PD analysis by UHF sensor and HFCT.
- D.G.A : Dissolved Gas in Analysis of transformer (hydrocarbon gas and moisture)
- OLTC : Motor drive currents, Motor operated contact(time & number of operations), Outside temperature
- Bushing : Leakage current, Capacitance, Power factor

| Diagnostic System in high-voltage Cable |

- PD in high-voltage cable : PD analysis by HFCT, metal foil sensor and UHF.

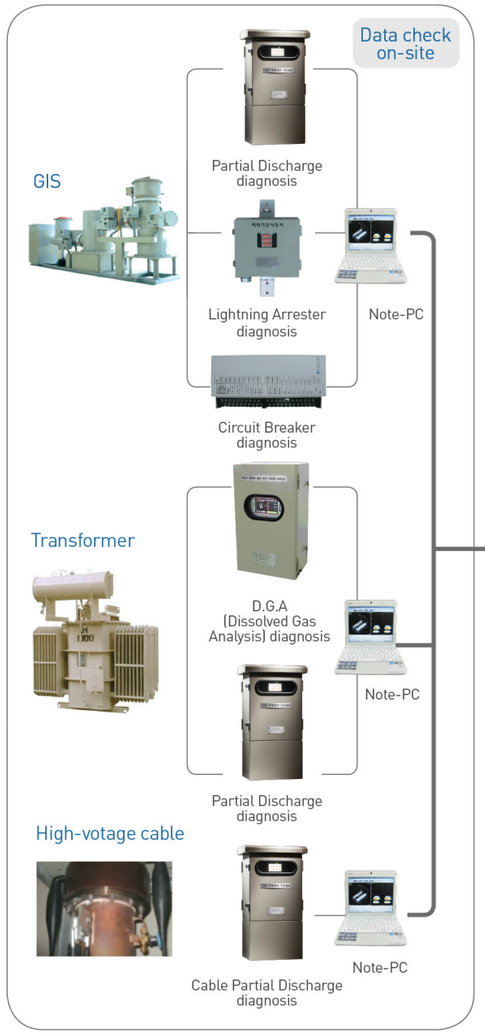
| Integrated Monitoring System |

- Monitors, saves, checks and manages the diagnostic data at the real time.
- Sends the alarm warning to main observer.
- Has the automatic stabilizer function at the error of H/W and S/W. (Built in watchdog circuit)
- Be economical by communication of web-browser method.
- checking the precise event information on site promptly with note-PC.
- IEC 61850 protocol is certified.

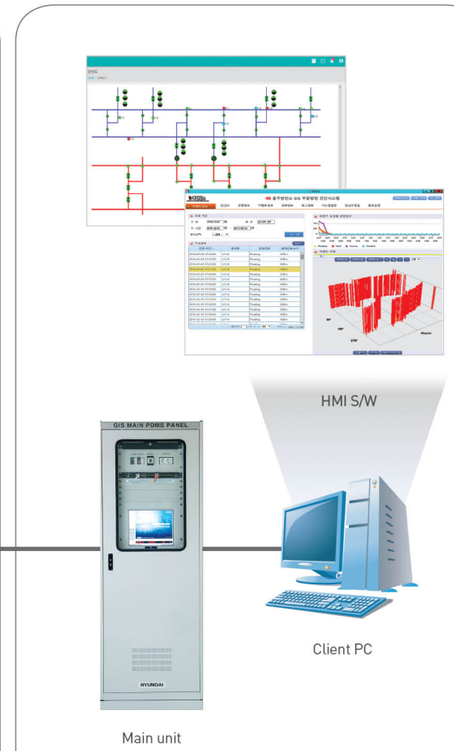
Features

- Total on-line diagnostic monitoring System by preventing a sudden accident at various electric power facilities can be prevented from being enormous economic losses.
- Through the total online diagnostic monitoring system the user is able to monitor all electric power facilities, at a glance.
- Online diagnostic monitoring system can be installed separately on the desired electric power facilities according to the customer's choice.

Diagnostic system



Monitoring system of data

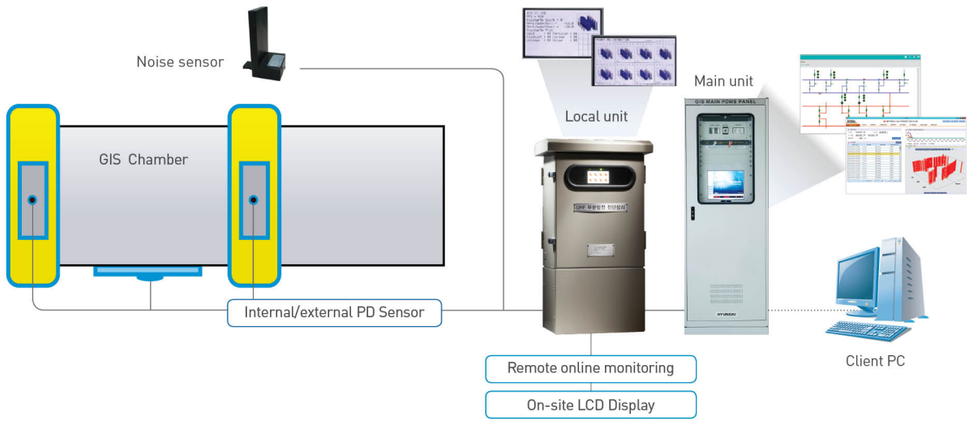


03 GIS Diagnostic System

GIS PD

GIS PD counter monitors PD occurrence within the GIS at the real-time. This counter saves PD event information on site promptly with note-PC. This counter can be expanded to on-line remote monitoring system easily by simple communication upgrade.

Configuration



System Configuration

PD Detector
- Input Channel : PD 6CH, Noise 1CH (up to 12CH)
- Installed PD algorithm
- Check whether the PD occurs, Real-time PD data
- Built-in PD algorithm for the determination of PD Type
- Communication : IEC61850

External UHF Sensor
- Frequency range: 500~1,500MHz
- Sensor sensitivity (below 5pC) : -40 [dBm]
- Attach way : Attached on GIS spacer

Noise Sensor
Detection bandwidth : 300 ~ 3,000MHz
Attach way: Be set up magnetically around GIS

HMI

Real-time event

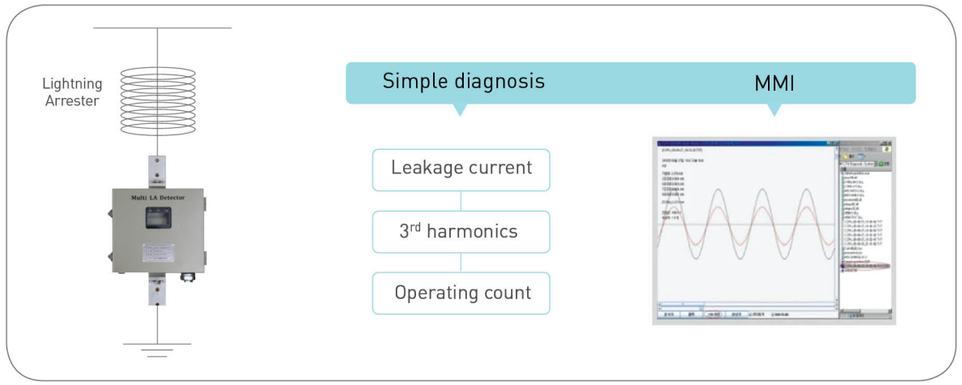
Event Views

Trend event data

Digital LA

LA, the only protecting device of power facilities, cause the blackout or heavy accident without the block of impulse surge. This system prevents the safety accident by monitoring the trend of LA aging state at the ordinary times.

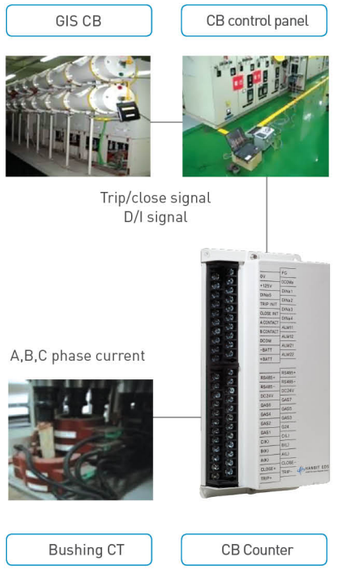
- Simple diagnostic result : Checked by LCD of counter.
- Detailed diagnostic result : Checked by being connected with Lap tap
- Remote monitoring : Expanded through RS485 & LAN communication.
- LA counter has been used with 100% in KEPCO in Korea.

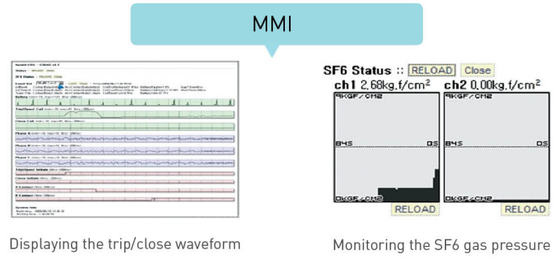


Circuit Breaker

Mechanical contacts of CB (Circuit Breaker) get ages by frequent operations. If CB is aged, the gap time difference is lager and the fault and abnormality for CB operation is increased

- Diagnoses the 22.9kV, 154kV, 345kV CB aging-state remotely through the close/open wave
- Diagnostic items : CB operation number, close/open gap time difference, bushing current and the acquisition of D/I and A/I signal.
- Monitors the SF6 gas pressure.
- Checks the data through the Ethernet communication.
- Increasing the gap time difference : Causes the 3-phase unbalancing and insulated accidents





Displaying the trip/close waveform

Monitoring the SF6 gas pressure

04 Transformer Diagnostic System

Outline

This system monitors and diagnoses the aging-state of transformer remotely. Tr PD diagnostic system diagnoses PD within the transformer and estimates the position of PD. And the dissolved gas diagnostic system within the transformer monitors the dissolved gas in the insulation oil.

Partial Discharge
- Diagnoses the occurrence of PD and arc within the transformer.
- Judges PD type through the 3D pattern analysis. If the burst signal occurs, this system estimates the
- position through the S/W algorithm.

D.G.A
- Monitoring gas : composed hydrocarbon gas (H_2,CO,C_2H_2,C_2H_4) and moisture(H_2O)
- Shortage of insulation oil and increase of acetylene gas : Can be exploded within 3~5 days.

Configuration

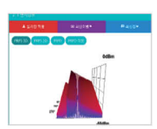
System Configuration

PD Detector
- Detected sensor : UHF, HFCT
- Input channel : Maximum 8 Channels
- Installed PD algorithm
- Check whether the PD occurs, Real-time PD data
- Built-in PD algorithm for the determination of PD type
- Communication : IEC61850

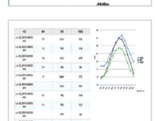
External UHF Sensor
- Detects the gas and moisture with single valve set-up.
- Attached way : Connected directly to the drain valve.
- Compatible with other companies D.G.A sensor capable, such as GE, MS, etc.

Noise Sensor
- Detected sensor : CT
- Diagnostic item : Power Factor, Capacitance, Leakage-Current
- Communication : IEC61850

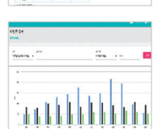
HMI



PD Diagnostic S/W
- Real-time 3D waveform monitoring.
- Detection of event wave.
- frequency Analysis.
- FFT signal analysis.
- Monitoring and storage of PD event.
- Estimation od PD position.



DGA Diagnostic S/W
- Acquisition and storage of real time data.
- Data conversion into the text or excel file.
- Trend prediction
- Alarm setting.
- Password protection of 2 step.
- External output : 4~20mA



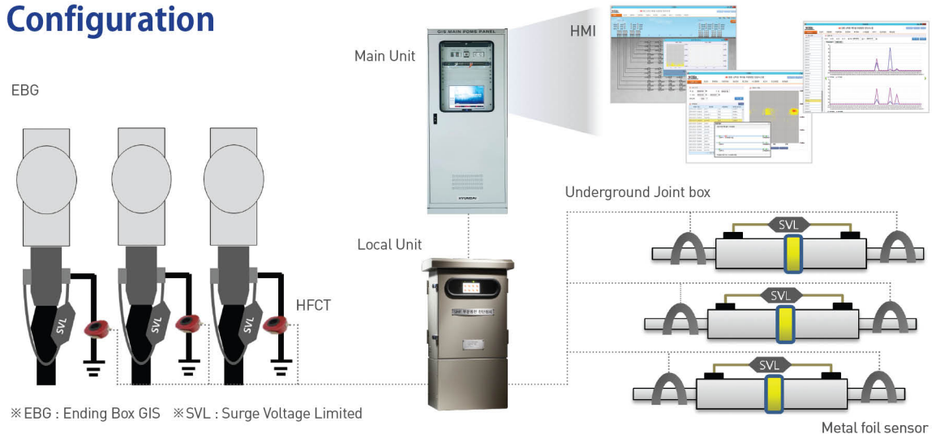
05 High-voltage Cable Diagnostic System

Outline

This system monitors PD of high-voltage cable by using metal foil sensor and HFCT.
The explosion accident were occurred in the joint region between high-voltage cable and GIS frequently in KEPCO of Korea.

- Measurement location : Joint box, EBG, EBA etc.
- Causes of PD for power cable : Manufacturing fault of cable, poor construction and Injury / thermal / electrical / mechanical stresses of the managing process.
- Improvement of PD recognition : Built-in algorithm of PD pattern recognition and PD decision.
- Economical cast : Acquisition and diagnosis of the data in PD detector.
- Excellent state expression of PD : PD occurrence, power source, sync. And communication state.

Configuration



※EBG : Ending Box GIS ※SVL : Surge Voltage Limited

System Configuration

PD Detector
- Detected sensor : HFCT, metal foil sensor
- Input channel : Maximum 6 Channels
- Installed PD algorithm
- Check whether the PD occurs, Real-time PD data
- Built-in PD algorithm for the determination of PD Type
- Communication : IEC61850

HFCT
- Range of detection frequency: 1 – 300MHz
- Detection sensitivity: Higher than 5pC
- How to attach: Fix with the external clamp

Rogowski coil
- Synchronizing signal sensor if utilizing the power with auxiliary battery in the place without commercial power
- How to attach: Fix with the external clamp

HMI

Real-time event

Event Views

Trend event data

06 Portable Diagnostic System

GIS PD

Portable GIS PD Diagnostic System (PoDAS)

- Diagnosis of PD inside GIS
- Input channel : PD 3CH, Noise 1CH
- Sensor
  - UHF sensor : 500~1,500MHz (Attached on GIS spacer)
  - Noise sensor : 300~3,000MHz
- Installed PD algorithm
- Diagnosis to types of PD : Particle, Void, Floating, Corona
- Noise gating in the original signal
- Provide HMI for analyzing the data

Lightning Arrester

Portable Lightning Surge Arrester Diagnostic System (PoLA&SVL

- Diagnosis of the aging state of lightning arrester
- Diagnosis items
  - Total leakage current
  - Resistive leakage current
  - harmonic (3rd, 5rd, 7rd, 9rd)
- Detected sensor : CT sensor
- Built in criteria for degradation of KEPCO and KESCO (Criteria for degradation can be built in, according to the customer's choice)
- The electric field reduction using a shield case
- Provide HMI for analyzing the data

High-Voltage Cable PD

Portable High-Voltage PD Diagnostic System (PoDAS C-100)

- Diagnosis of PD in high-voltage cable
- Input channel : PD 3CH, Noise 1CH
- Sensor
  - HFCT : 1~300MHz
  - Noise sensor : 7~430MHz
- Measurement location : Joint box, EBG, EBA etc
- Installed PD algorithm
- Noise gating in the original signal
  Provide HMI for analyzing the data

Multi Sensor PD

Multi Sensor PD Diagnostic System (MSD-100)

- Simple diagnosis of PD in various electric facilities
- Diagnostic facilities : GIS/GIB, Transformer, CB and panel
- Input channel : 4CH
- Detected sensor
  - UHF sensor : 500~1,500MHz
  - HFCT : 1~100MHz
  - TEV sensor : 1~50MHz
  - AE sensor : 5~500kHz

  Capturing to real-time PD data
  Provide HMI for analyzing the data

07 Engineering Service of Electric Power Facilities

Diagnosis of Electric Power Facilities

- Partial discharge diagnosis of GIS
- Partial discharge diagnosis of power transformer
- Partial discharge diagnosis of power cable
- Deterioration diagnosis of lightning arrester

Diagnosis and Design of Grounding System

- Reviewing and diagnosing grounding system of substation or power plant in state of operating
- New designing grounding system

Diagnosis and Design of Lightning Protection

- Reviewing and inspecting lightning protection of S/S or power plant in state of operating
- New designing lightning protection