



**ONLINE CONDITION
MONITORING SOLUTION**

OUR STORY

We are professionally managed and fast growing Indian company specializing in Electrical Generation Transmission & Distribution EPC contracts, electrical substation full integration and supply of testing and measuring, as well as monitoring products and services. Our mission is to provide exceptional solutions to the energy sector, ensuring efficient and reliable transmission and distribution systems.

With our expertise in Real time Online condition Monitoring Solutions, Electrical EPC contracts, we offer comprehensive end-to-end solutions for Oil and Gas , Generation Transmission & Distribution projects. From initial design and planning to execution and commissioning, our dedicated team of professionals ensures the successful implementation of projects, meeting the highest industry standards. We take pride in our ability to deliver on time delivery and working together with users per their end needs.

Our team had more than 20+ years of experience in dealing with all major Power Segment customer in India territory like Oil and Gas , Industrial and T&D customers. In the past, we have worked directly with OEM Direct sales management like ABB, CG, GE, Toshiba, TNR, TBEA, BHEL, ECE and all other OEMs in India.

Thank you for visiting our website. We invite you to explore our wide range of services, products, and expertise. Let us be your trusted partner in Transmission & Distribution EPC contracts, electrical

substation testing and measuring, and monitoring services.

MISSION

To attain global level best manufacturing facility and proving world class quality level product and services
To provide affordable, reliable and high-quality products and solutions where we need to improve more through new technology development

To achieve excellence in service quality, reliability and customer care to that level so there is no need for the same in future

To earn the trust and confidence of all customers with reliability and on time support

To consistently achieve high growth with the highest levels of productivity and on time delivery according to demand

VISION

"To add value to India Power, EV, Oil and Gas, health and testing and measurement sector along with related condition monitoring software where requirement of high quality online and remote monitoring is the essence for development for India & Worldwide."

- Quality
- Customer Satisfaction
- Safety
- Experts Team
- Reliability
- Commitment

INTERNATIONAL BRAND PARTNERS



NV SubPower Product Portfolio

1. Online Wireless monitoring for Substation and Distribution System (Patent Published into Journal)
2. AI based Wireless condition monitoring for SubStation and Distribution System (Development Stage: Patent Published into Journal)
3. Online Based Temperature Monitoring Solutions for electrical substation.
4. Online Dissolve Gas Analyser – up 9 gas with moisture PAS technology based.
5. Online bushing and Tandelta Monitor.
6. Lighting arrestor monitoring.
7. Online Fiber optic temperature monitoring for Transformers.
8. Switchgear and Bus Bar Temperature Monitoring.
9. Partial discharge Monitoring.
10. Online Electrical Signature analyser.
11. Online Motor Power Quality Monitoring solutions.
12. Online current health Index monitoring for rotating machines.
13. Online condition monitoring solutions for electrical substations.
14. Online Transformer Monitoring.
15. Online Industrial and Switchyard Panels.
16. Online Switchyard Electrical Signature and Power Quality Monitoring.





Hanbit



NV SUBPOWER
Stay ahead in Monitoring

Dissolved gas monitor device measuring gas concentration and H₂O for oil-immersed transformers provides a real time inspection for early detection on faults in transformers

BENEFITS

• PAS(Photo Acoustic Spectroscopy)

- Enhanced product life cycle
- Easy & affordable maintenance
- No need for carrier gas
- Minimized spare parts
- Simple structure, high accuracy, less failure
- Stabilized with wide measuring range

⑧ PAS(Photo Acoustic Spectroscopy) :
a most cutting-edge method of analyzing gas by means of the effect of absorbed light energy on gas with acoustic detection

• i-DGMS

(*intelligent* Dissolved Gas Monitoring System)

- Local S/W allows data collecting program for transformer faults
- Operation settings, graphics and data management
- Set up a diagnostic criteria

• Specification Upon Needs

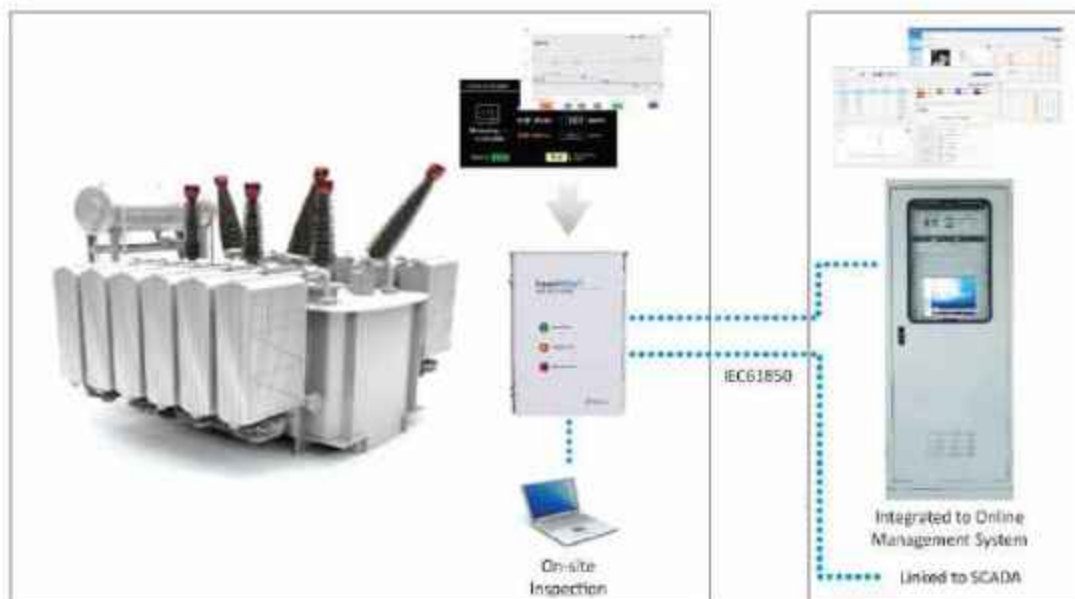
- Select up to 7 gases
- Gas selection considering transformer capacity, faults to be detected and types of insulation oil
- Transformer capacity :
1 gas type, 3~7 gases type, multi-tank type
- Faults to be detected :
H₂ / C₂H₂ / C₂H₄ type, etc.
- Insulation oil(vegetable oil, non-flammable oil) :
H₂ / C₂H₂ type, etc.

• t-DGMS

(*total* Dissolved Gas Monitoring System)

- Online t-DGMS allows monitoring and remote controlling in real-time
- Compatible with Online Electrical Asset Monitoring System
- Integrated to online GIS/TR monitoring system (i-TODs)

SYSTEM CONFIGURATION



hanbitDGM 3~7

FEATURES

- Measuring gas : H_2 , CH_4 , C_2H_6 , C_2H_4 , C_2H_2 , CO , CO_2 (H_2O)
- Measuring method : PAS, semiconductor sensor
- LCD(7.0") : operational data, test and diagnosis result
- LED : Power / Device Error / Gas Alarm
- Settings : operating time & cycle, diagnostic criterion
- Measuring cycle : min. 1hr
- Diagnosis of transformer fault based on gas concentration and trend



hanbitDGM 3T

FEATURES

- 3 tanks in 1 monitor - minimized installation space
- Measuring without contaminating oil or gas
- LCD(7.0") : operational data, test and diagnosis result
- LED : Power / Device Error / Phase A, B, C Gas Alarm
- Settings : operating time & cycle, diagnostic criterion
- Measuring cycle : min. 3hr
- Applicable to 3 phase transformer



** Designated as KEPCO exclusive DGA supplier over 9 gas GE, Camlin DGA - March, 2023
sole winner with no mixed oil error



KHNP
Korea Hydro & Nuclear Power
Preferential Product of Purchase



KOEN
Korea South-East Power
Preferential Product of Purchase



KEPCO
Korea Electric Power Corporation
hanbitDGM7
Technical Certificate of accuracy

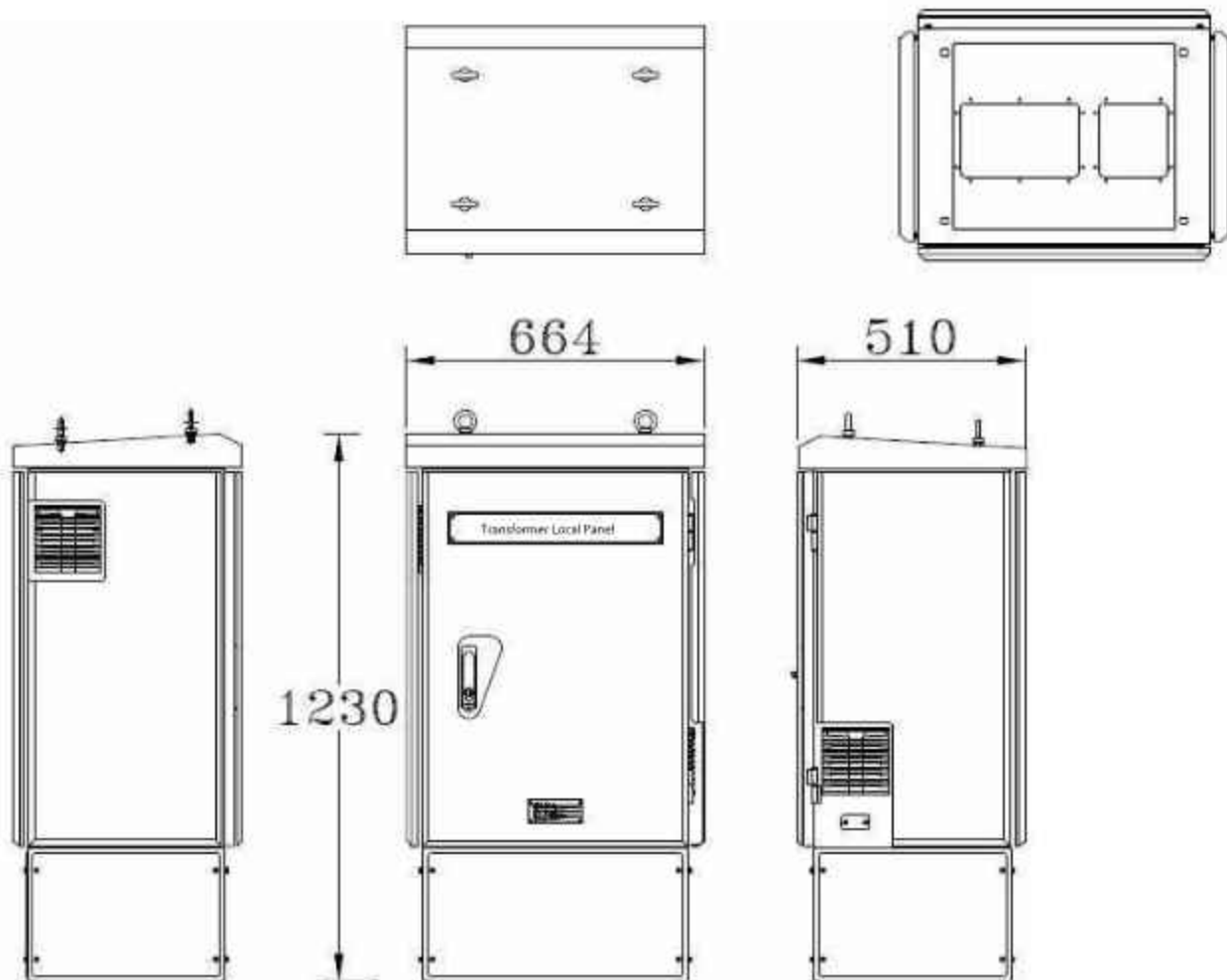


KEPCO
Korea Electric Power Corporation
hanbitDGM3T
Technical Certificate for sole tender

BUSHING

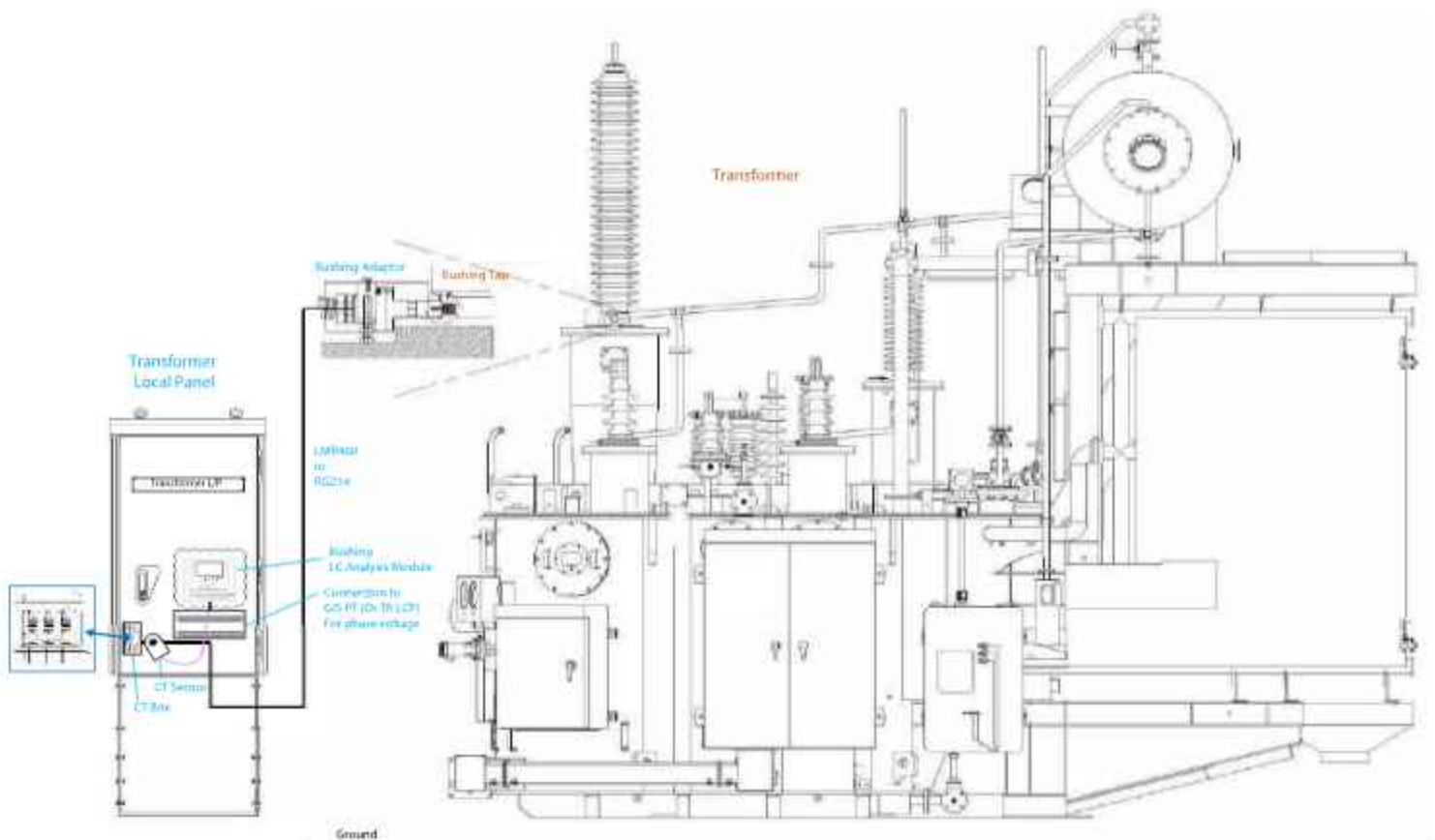
PERTAMINA - Transformer Monitoring System PJT

Drawing : Transformer Local Panel



Transformer Monitoring System

Bushing Site Plan - Design Drawing



Transformer Monitoring System

Bushing Installation Requirements

1. Installation Design Meeting

- Survey is required for the installation.
- Before installation, design meeting is required.
- Floor plan drawing of the factory in full is required.

2. Installation Material

- After installation Design Meeting....
 - HanbitEDS shall provide a list of required material for installation to match specs with client transformers.

3. HabitEDS Supervisor

- One (1) engineer with +5 years experience.
- 2-3 working days (for 1-3 sets of TR) for installation (Estimated)
- Extra Working days, if required upon site circumstance, will be charged additionally.

4. Local Workforce

- At least two (2) persons.
- Technicians with at least each + 2 years experience.
- 2-3 working days are required (if or facility halt needed) (For 1-3 sets of TR)
- Generally acceptable capability of electrical & communication construction.

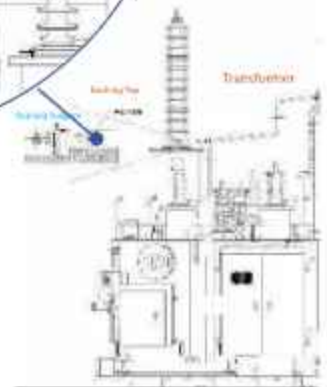
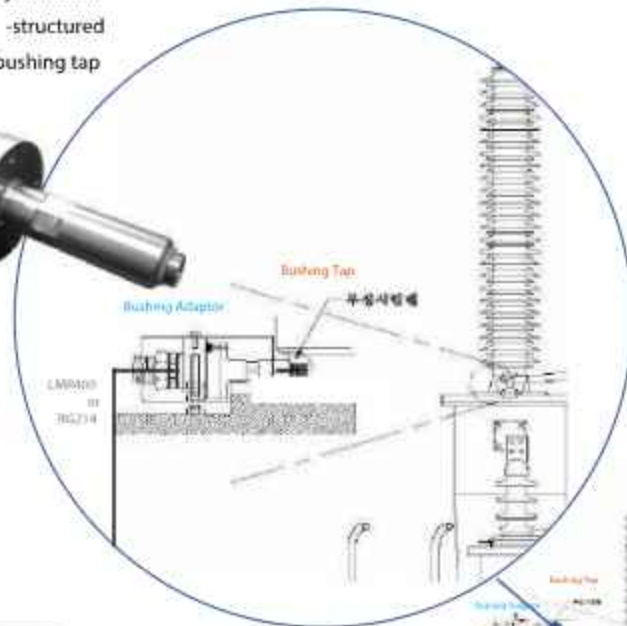
Transformer Monitoring System

Bushing Adaptor

Bushing adaptor specification
Upon clients transformers specification.

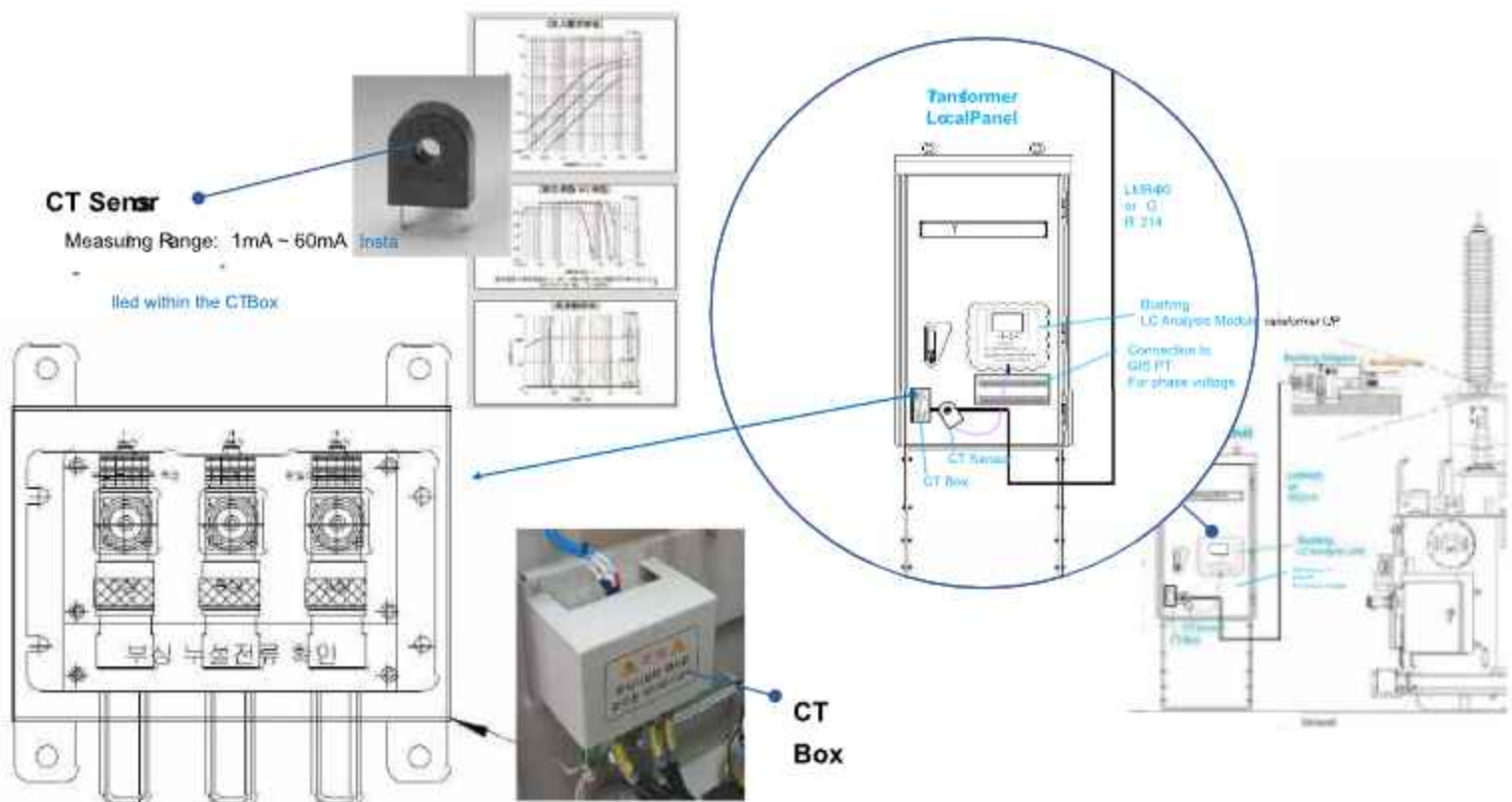


Conjunction of
two-parts-separate -structured
bushing adaptor with bushing tap



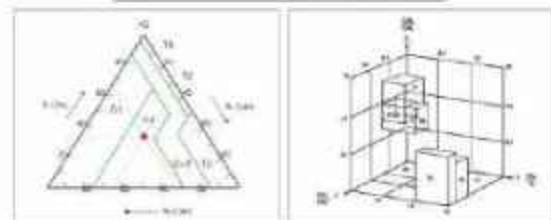
Transformer Monitoring System Leakage

Current CT



t-DGMs (Online DGA Monitoring S/W) (Optional)

- Remote monitoring in real-time
- Remote control on operational data and settings
- Diagnose concentration and trend in fault gases
 - Normal/Abnormal/Warning
- Evaluates degradation in progress by CO and CO₂
- Creates a report on diagnosing result with DB and graphics
- Event alert with diagnosis of transformer
- Integrated diagnosing methods
 - Algorithm learning from accumulated test results (KEPCO, IEC, IEEE, Duval's Triangle, etc.)
 - Analyze faults in transformer (PD, thermal degradation, arcing, etc.)



KOLAS AUTHORIZED TEST

Category	Test	Result
Electrical Test	IEC 60255-5 (Insulation Resistance Test)	Pass
	IEC 60947-5-2 Clause 8.3.3.4 or IEC 60950-1 (Power Frequency Voltage Test)	Pass
Environmental Test	IEC 60068-2-6 (Test Fc: Vibration (sinusoidal))	Pass
	IEC 60068-2-1 (Test A: Cold)	Pass
	IEC 60068-2-2 (Test B: Dry heat)	Pass
	IEC 60068-2-30 (Test Db: Damp heat, cyclic (12 h + 12 h cycle))	Pass
Electromagnetic Compatibility (EMC) Test	IEC 61000-4-2 (Electrostatic discharge test)	Grade A (Pass)
	IEC 61000-4-3 (Radiated, radio-frequency, electromagnetic field immunity test)	Grade A (Pass)
	IEC 61000-4-4 (Electrical fast transient/burst immunity test)	Grade A (Pass)
	IEC 61000-4-5 (Surge immunity test)	Grade A (Pass)
	IEC 61000-4-6 (Immunity to conducted disturbances, induced by radio-frequency field)	Grade A (Pass)
	IEC 61000-4-8 (Power frequency magnetic field immunity test)	Grade A (Pass)
	IEC 61000-4-11 (Control Power Failure Test)	Grade A (Pass)
Ingress Protection Test	IEC 60529 (Ingress Protection Test) – Degrees of dust-proof/water-proof	IP55 / IP56 (Pass)

Business

Electrical Asset On-line Monitoring System



An integrated On-line Monitoring System for electrical facilities in substations for the purpose of protecting facilities from potential damages in advance

- GIS : Partial Discharge, Circuit Breaker's operation characteristics, Lightning Arrester Deterioration
- Transformer : Dissolved Gas Analysis, Partial Discharge, On-Load Tap Changer, Bushing
- Cable : Partial Discharge, Sheath Voltage Limiter Deterioration

Portable Diagnostic Device for Electrical Facilities



- Portable GIS Partial Discharge Diagnostic Device
- Portable Cable Partial Discharge Diagnostic Device
- Portable Lightning Arrester deterioration Diagnostic Device

Diagnostic Engineering for Electrical Facilities

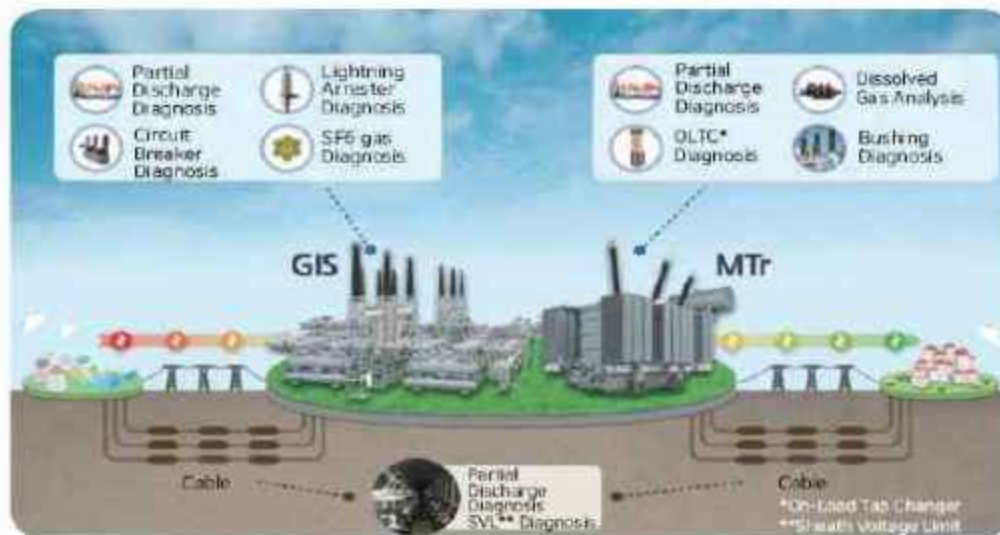
Provide a specialized diagnostic engineering service for stabilized power supply and with 20+ years' expertise and experience

- Partial Discharge Diagnosis for GIS, Transformer and Cable
- Deterioration Diagnosis for Lightning Arrester, Circuit Breaker
- Earth Grounding Diagnosis and Design
- SCBS Diagnosis

Electrical Asset On-line Monitoring System

Integrated monitoring system for early detection of PD on GIS/GIB/transformer/cables, operational characteristics on CB, deterioration on lightning arrester and dissolved gas analyzing for the purpose of protecting electrical facilities from potential accidents and critical loss in advance

System Configuration



Diagnosis System



GIS/GIB

- Partial Discharge(GIS)
- Operational Characteristics (Circuit Breaker)
- Deterioration(Lightning Arrester)
- Gas Concentration(SF6 Gas)



Transformer

- Partial Discharge
- Dissolved Gas Analysis
- OLTC
- Bushing



Cable

- Partial Discharge
- SVL Leakage Current

Data Management



Diagnosing Unit

User PC





VOLTA INSITE



NV SUBPOWER
Stay ahead in Monitoring



Predicting Failure, Preventing Loss

What if you could predict the future?

All businesses have electrical architecture that is vital to their operations. If there ever is an issue with this equipment, the cost of downtime can be significant. Understanding your operations on a granular level can provide you with information to prevent any surprise downtimes, reducing overall costs of operations and optimising your business.

Volta Insite™ provides the gold standard for electrical data and predictive analytics for mission critical equipment. You can understand your data, pinpoint any issues and solve them before the problem becomes costly.

Empowering You With Electrical Data

Our focus is on collecting electrical data and offering predictive analytics for mission critical equipment. With the advent of edge computing and recent advances in data acquisition, we can continuously monitor entire electro-mechanical systems, accurately identifying underlying failure mechanisms.



Gain Some Insite

Volta Insite™ measures the voltage and current of your critical assets and processes this information in our cloud, where our team and yours are alerted if anything goes wrong in real time.

Volta Insite™ Capabilities

- Remote, 24/7 Monitoring
- Programmable Resolution
- Unlimited Waveform Capture
- Power Quality Metrics



Assess Your Critical Assets

Determine which of your equipment is vital to your operations.



Contact Us

Email or call us so we can personalise Volta Insite for your electrical infrastructure.



Install and Activate

Our nodes are easy to install and can be done by your system operators during regularly scheduled downtime.



Monitor

Once installed, your data will be directly available on your devices for constant monitoring.

OUR GOAL IS ZERO UNEXPECTED DOWNTIME AND LOWER OPERATING COSTS



→ WHY VOLTA INSITE™

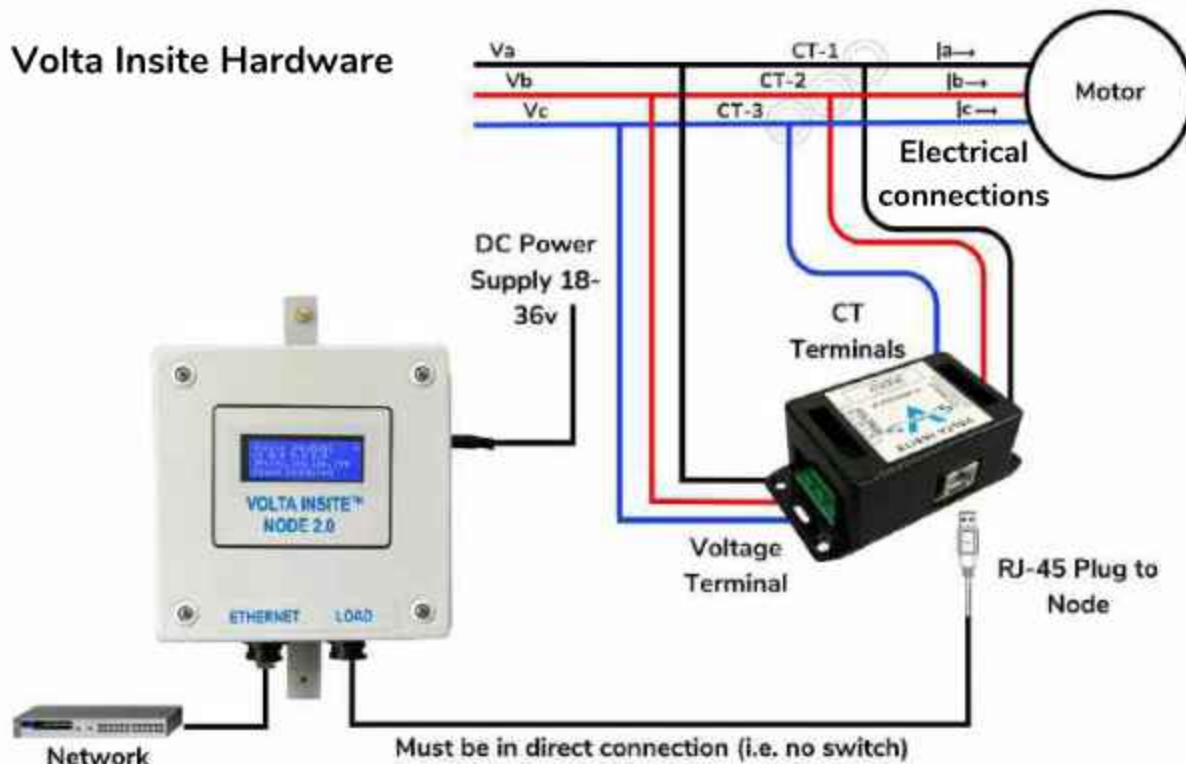
With Volta Insite's predictive maintenance, customers experience a positive ROI within a few months.

- Reducing equipment downtime.
- Reducing hours of labor for maintenance and diagnostics.
- Reducing costs of equipment replacement.
- Utility Level Power Quality, what's being delivered?
- Back-up Power Quality, what's being generated?
- Compiling a complete understanding of electrical asset behavior.

Volta Insite's engineers support all data interpretation to help our users fully understand the health of their electrical system.

EMPOWERING YOU WITH ELECTRICAL DATA

Volta Insite Hardware



There are two major hardware components to the Volta Insite solution that require installation:

Node 2.0

The Node acquires and collects data to perform all computing and measurement functions. The Node reports this input to the cloud and provides information to the user interface upon request. Typically mounted in the MCC room, this device can be placed inside a cabinet if needed, but it is preferable and recommended to be mounted externally to allow for accessibility during operation.

VI Module 3.0

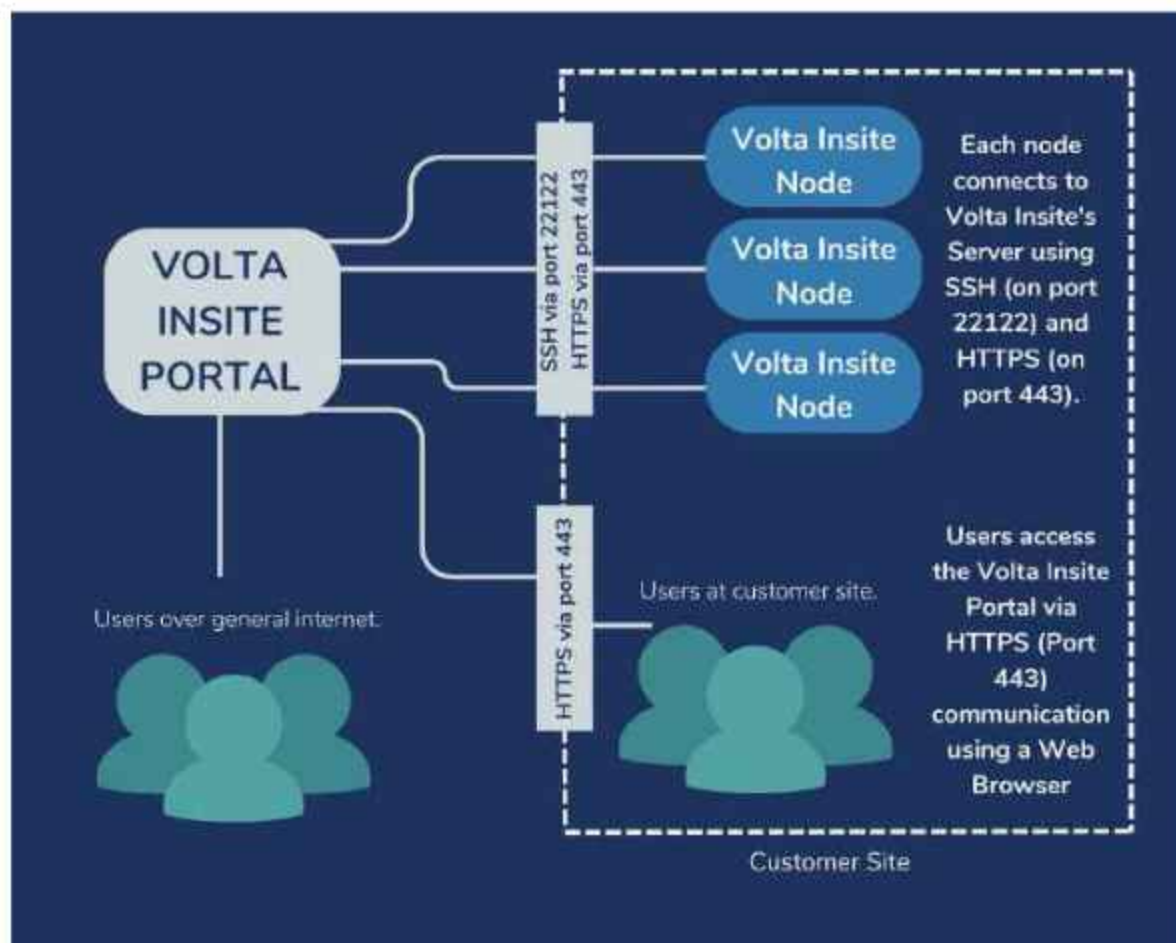
Each Node comes with a VI-Module which mounts within a cabinet, fused disconnect, MCC bucket or other suitable location. The VI-Module has terminals for connecting current transformers and Voltage taps.

LEADING THE DIGITAL TRANSFORMATION

Connecting to the Cloud

Volta Insite Nodes communicate securely with the cloud through a customer's Ethernet network. No additional software is required on-site. If no network is available, a 4G communication module can be used instead. Once data from the Node is uploaded to the Volta Insite Cloud, it is run through the InsiteAI™ (Automated Intelligence) for analysis. If an anomaly is detected, our team of engineers will assess the issue to determine its cause.

Volta Insite's data and analytics can also be integrated with third-party software upon customer request.

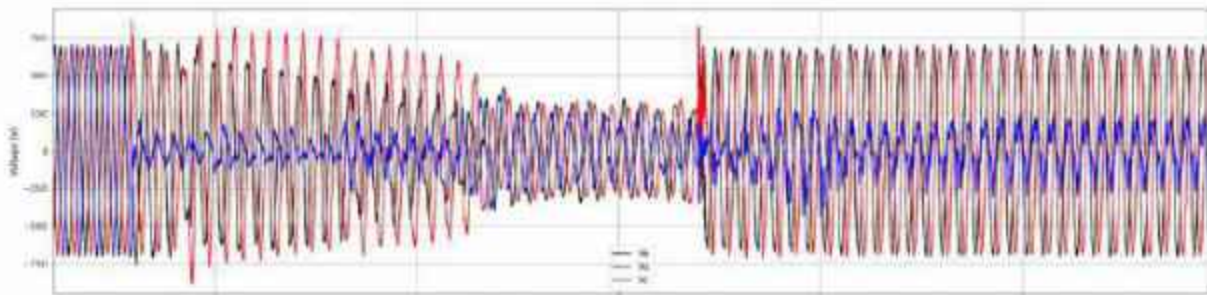


PREDICTIVE MAINTENANCE WITH REAL-TIME INTELLIGENCE

Power Quality Analysis and Transient Captures

One of the often overlooked inputs into a facility is the quality of the electrical power. Power interruptions and short duration phase drops causes inconveniences and extends outages due to equipment degradation. This is due to transients associated with switching between utility and back up power. The poorer the power quality, the higher the usage of the back-up generation equipment. This demands increased maintenance and raises operational costs.

Maintenance personnel often use the term 'ghost electrical problems' to describe electrical issues that are difficult to diagnose. In reality, they can be attributed to power quality events or intermittent faults caused by equipment degradation.



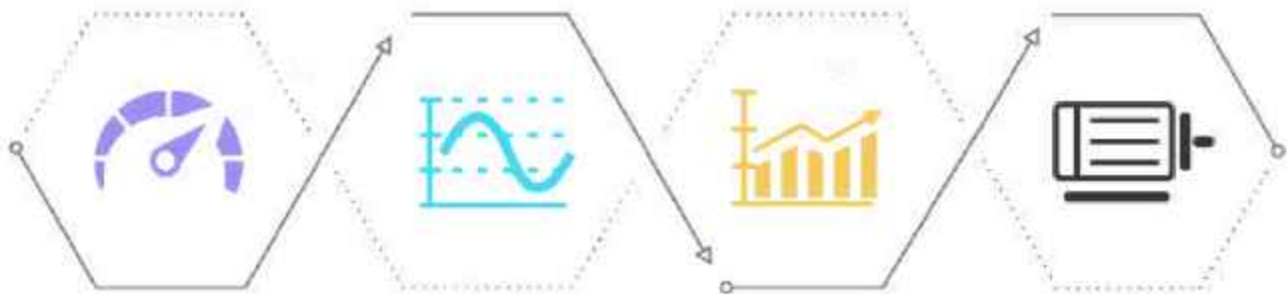
Volta Insite's continuous transient captures provide accurate data for precise analysis and efficient diagnostics, reducing reliance on guesswork. This results in significant cost savings on maintenance and minimizes equipment downtime.

Volta Insite is a pioneer in distributed electrical signature analysis (ESA) and specializes in techniques that focus on the physical correlation of data. Our instruments cover multiple components and can cross-check events that occur simultaneously on different pieces of equipment. With our InsiteAI, we can isolate various issues to quickly and accurately determine if problems exist beyond interconnected machinery.

NEXT GENERATION TOOL SET FOR OPTIMIZING ELECTRICAL PERFORMANCE

Electrical Signature Analysis

Volta Insite starts by capturing the current and voltage signals of an electrical load or source, utilizing Electrical Signature Analysis (ESA) as a foundation. These captures are graphed in the frequency domain, which reveals a distinctive electrical signature. Baseline numbers are established from the electrical signature, and changes from this baseline can be monitored and reported over time.



Electrical and mechanical problems in a generator or motor will produce harmonics in the voltage and current signals. These harmonics produce unique patterns that can accurately identify the problem. Volta Insite provides customers with access to real-time intelligence, mobile alerts, and a database of equipment history, allowing them to identify and plan for maintenance before catastrophic failures occur. This proactive approach reduces costs and eliminates unplanned downtime, ultimately increasing the reliability and longevity of the motor.

Volta Insite's continuous transient captures enable precise analysis and facilitates expedited diagnostics through data-driven methods, eliminating guesswork. This approach significantly lowers maintenance costs and minimizes downtime, allowing for efficient and effective equipment management that is simple and comprehensive to use.

ESA data serves as a valuable resource for algorithms that aim to extract increasingly detailed insights into system operation.

TOMORROW'S PREDICTIVE MAINTENANCE - TODAY

Case Studies

We Saw A Solution

Volta Insite has a customer who uses a raw cutter machine to convert hardwood timber into lumber. The machine features a 2500-hp 480-V three-phase 6-pole induction motor that is powered by a system of pulleys and a belt, which drives a large circular saw blade. The belt operates at a frequency of approximately 3 Hz, and any increase in the spectral peak at this frequency can indicate a problem with the belt's operation. With Volta Insite's ESA monitoring, early signs of belt degradation were detected, allowing the company to schedule a belt-change during the facility's normal closed hours, avoiding any loss of production time.

It Was Just A Phase

Volta Insite was brought in to monitor two critical exhaust fans that had been experiencing frequent service calls due to VFD error codes and parameter settings. Upon connecting to the cloud, InsiteAI software quickly identified an abnormal current imbalance. We investigated further and discovered that one of the motor phases was arcing to the ground, which had been hidden away in the motor junction box. Once the issue was repaired, the exhaust fans resumed normal operation.

Insite Heals a Hospital

During the commissioning of a new hospital, multiple black-out tests were performed, resulting in incidents of motor and VFD failures on air recirculation fans. Volta Insite was called in to investigate. Concerns were raised about transients and overvoltage conditions due to the presence of numerous harmonic filters in the facility, and their potential impact on the current and voltage of the power distribution system. After conducting an InsiteAI analysis, we confirmed that voltage transients were minimal and not the root cause of the problem. Instead, we discovered that the failure was due to the faulty manufacturing of the air recirculation fan motors. Volta Insite identified and resolved the issue, thus solving the problem.

PREVENTATIVE ELECTRICAL ANALYSIS - MADE TO EDUCATE

Data Collection

Once installed, our Insite Node continuously provides real-time readings of voltage and current.

Data Analysis

The collected data is then transmitted to our InsiteAI software for thorough analysis. This software solution accurately diagnoses a motor's electromechanical condition and assesses the quality of power supply.

Intelligent Actions

Customers can access real-time intelligence, receive alerts, and review a database of equipment history, enabling them to leverage our powerful predictive maintenance technology.

Scalable

Our architecture enables the networking of additional Insite Nodes, allowing for comprehensive monitoring of entire electrical systems.







OSENSA
INNOVATIONS



NV SUBPOWER
Stay ahead in Monitoring

EXCELLENCE IN INNOVATION

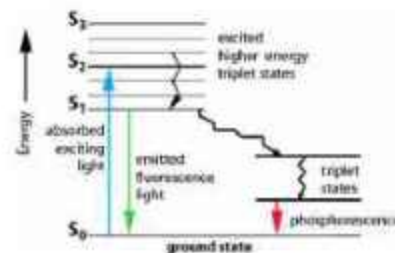


FIBER OPTIC TEMPERATURE MONITORING



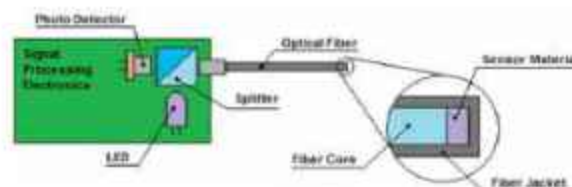
FLUORESCENT TECHNOLOGY

The scientific principle is
Fluorescent Time Decay



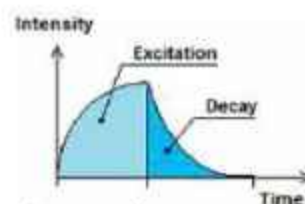
OSENSA's technology leads the world in accuracy

A special fluorescent
phosphor is excited with light



OSENSA uses an exceptionally long -life LED source

Electronics measure the time
constant (τ) for the glowing
phosphor which is proportional
to temperature



$$I(t) = I_0 e^{-t/\tau}$$

A shorter decay time means higher temperature



KEY MARKETS



Oil-Filled
&
Dry-type
Transformers



Switchgear
&
Busbars



Motors
&
Generators



Microwave
&
Induction Heating



MRI
&
Life Sciences



Medical
Research



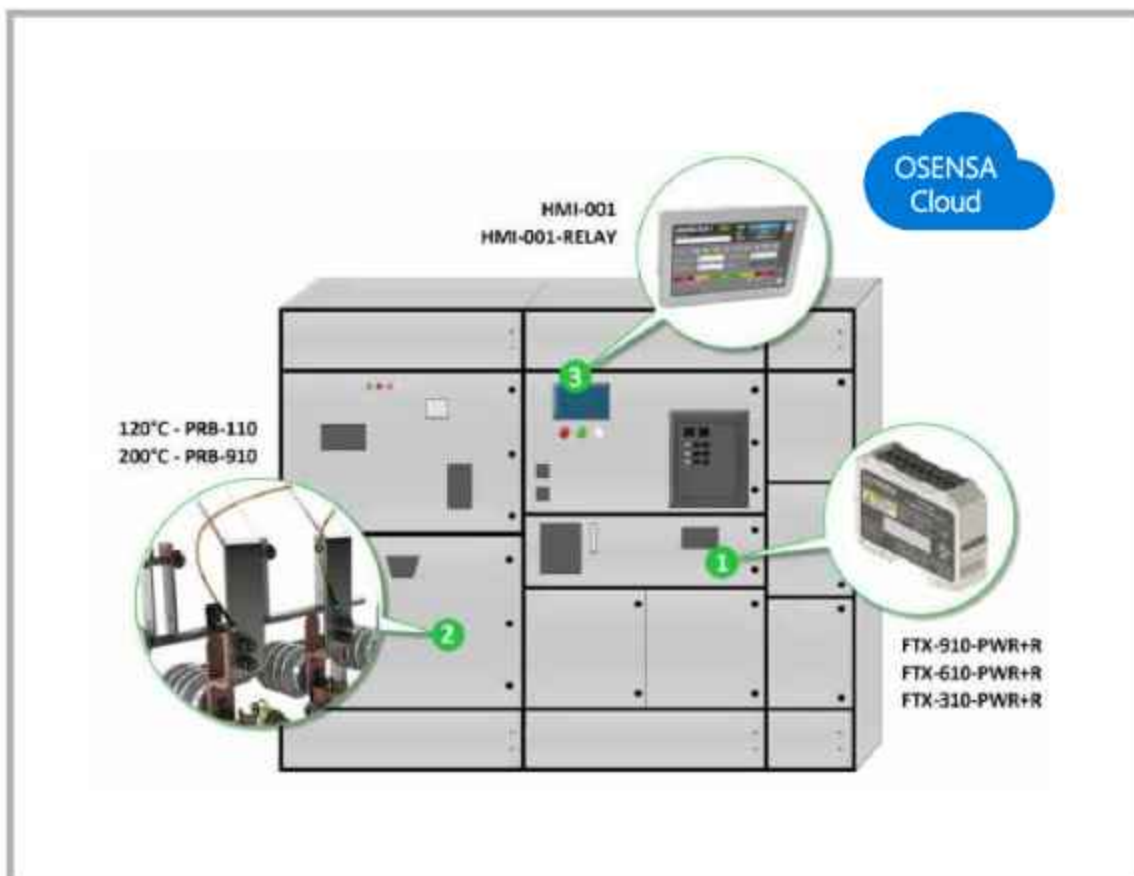
Semiconductor

SWITCHGEAR AND BUSBAR THERMAL MONITORING

Osensa has developed the worlds most reliable temperature sensing solution for switchgear and busbar monitoring.

- ✓ No calibration, no maintenance.
- ✓ High accuracy.
- ✓ Wide sensing range.
- ✓ High reliability technology.
- ✓ Simple installation.
- ✓ Long Life.

(Designed to last for the life of the switchgear)



HARDWARE OPTIONS

3,6, or 9 Channel transmitters with 2 relay outputs for alarms

- FTX - 310 - PWR + R
- FTX - 610 - PWR + R
- FTX - 910 - PWR + R

Two 38kV fiber optic probe options

- PRB - 110 - 5M - ST - TP2
- PRB - 910 - 5M - ST - TP2

PRB-110 (120°C max. temperature at ring)



PRB-910 (200°C max. temperature at ring)



FTX - 910 - PWR + R



Measurement Range	-40°C to +200°C
Resolution	0.1°C
Accuracy	± 0.1.0°C

NEW INSTALLATION SCHNEIDER SWITCHGEAR IN VIETNAM



CABLE TERMINATIONS



OSENSA sensors recently installed on cable terminations at a Canadian Energy company where their switchgear twice blew up under irregular loading conditions.

If left unchecked, medium voltage cable terminations will eventually fail. Failure is typically caused from corrosion, dielectric breakdown of insulation, repeated thermal cycling or vibration loosening the bolts.



INDUSTRIAL CAST RESIN TRANSFORMER MONITORING

- FTX - 310 - PWR + R 3 Channel Temp Transmitter
- FTX - 610 - PWR + R 6 Channel Temp Transmitter
- FTX - 910 - PWR + R 9 Channel Temp Transmitter



Measurement Range	-40°C to +200°C
Resolution	0.1°C
Accuracy	± 0.1.0°C
Programmable Alarms	2x Form A Relays



PRB - 910 (200°C Max. for 1m probe tip)



CERTIFICATIONS



INTERNATIONAL BRAND PARTNERS Hanbit CUSTOMERS

 TENAGA NASIONAL	 أرامكو السعودية saudi aramco	 GAR	 CEMCO	 KINP	 ЭЛЬГАУГОЛЬ ELGACOAL エルガ石炭 埃尔加煤炭 엘가석탄
 TRAFOINDO POWER PT. TRAFORINDO KONGKA INDOESTRA	 الشركة السعودية للكهرباء Saudi Electricity Company	 Hanwha Solutions	 SK E&S	 KINP	 ILJIN
 K water	 KEPCO	 KORAIL	 VITZRO SYS GROUP SINCE 1985	 CWP 한국수력원자력 (주) Korea Hydro & Nuclear Power Co., Ltd.	

OSENSA CUSTOMERS INNOVATIONS

 NIST National Institute of Standards and Technology	 SIEMENS	 ABB	 Schneider Electric	 UNIVERSITY OF IOWA HOSPITALS & CLINICS	 OAK RIDGE National Laboratory
 Ames Research Center	 General Electric	 Children's Hospital of Philadelphia	 EATON	 SHONMIN COUNTY PUD PUBLIC UTILITY DISTRICT NO. 1	 ALSTOM
 MIT Massachusetts Institute of Technology	 HARVARD UNIVERSITY	 Portland General Electric	 conEdison	 APPLIED MATERIALS	 FLUENCE A Siemens and AEC Company
 CALIFORNIA INSTITUTE OF TECHNOLOGY	 IPGP INSTITUT DE PHYSIQUE GLOBALE 11 rue de l'Université 75013 PARIS	 MAX PLANCK GESELLSCHAFT	 SUNCOR ENERGY		



-: REGISTERED ADDRESS :-

NV SUBPOWER PRIVATE LIMITED

603, Signet Hub, Nr. Akshar Chowk, Old Padra Road, Vadodara - 390 020.

M : +91 81409 80160, +91265 - 3557650

Email : sales@nvsubpower.com / n_var@nvsubpower.com

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