Transformer & Switchgear

Thermal Monitoring

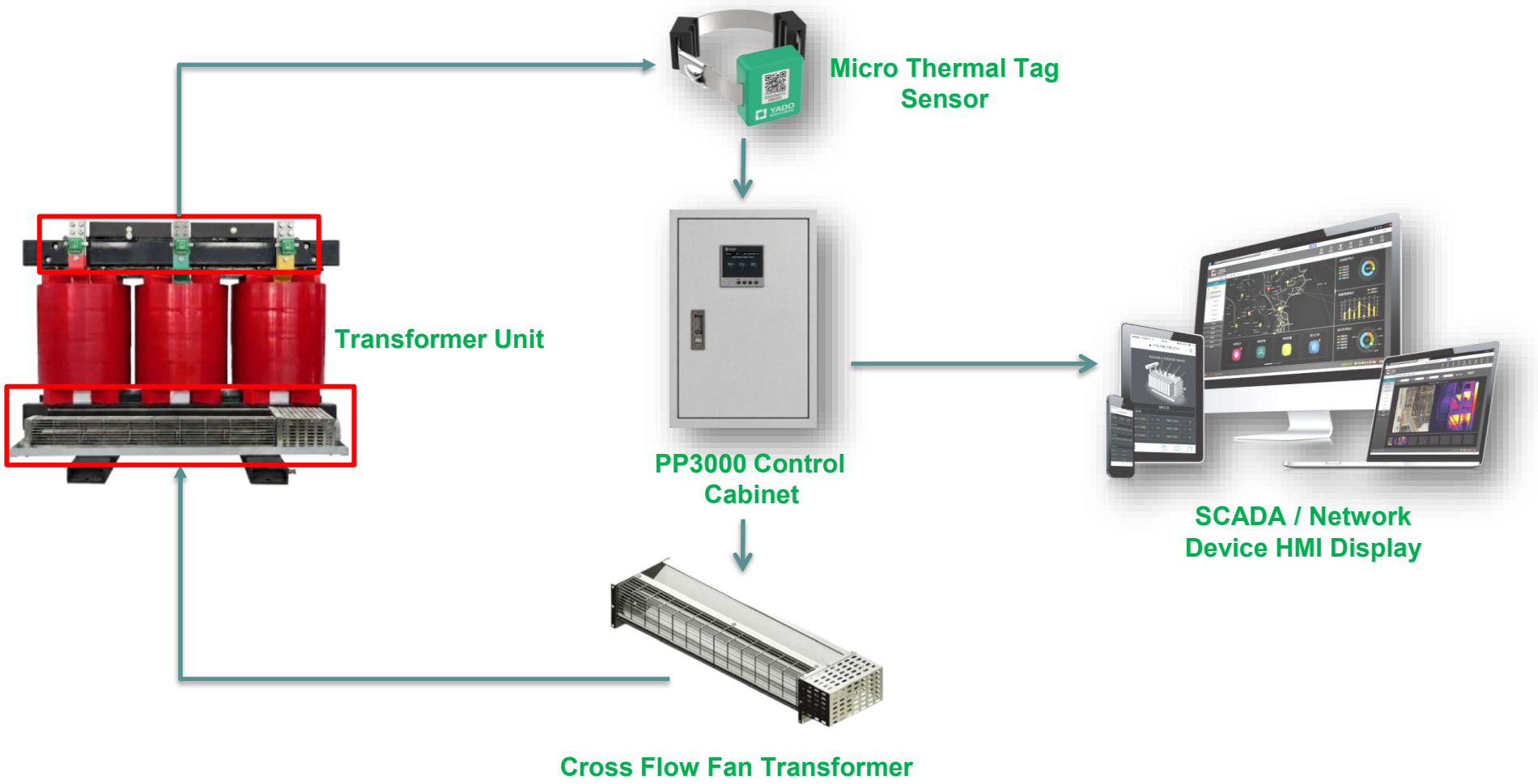
Wireless proactive thermal monitoring and detection system for power transformers and high-voltage equipment

By

Micro Thermal Tag & PP3000

Self-Powered Tech | 2.4GHz LoRa Wireless | IEC 62271 Type Tested

Transformer Monitoring



Blind spot and heat-related risks

Beyond Winding Monitoring

Protecting only the internal windings may no longer be sufficient. Statistics indicate that over 70% of failures originate from external connection points, such as loose busbar connections or deteriorated contacts.

Thermal Blind Spots

Conventional protection systems have "blind spots" that fail to reach critical points (hot spots) outside the transformer, leading to escalating heat accumulation and severe equipment damage.

The Cost of Downtime

Even a slight delay in detection can lead to power system outages and damage, the cost of which far exceeds the price of the protective equipment itself.



Engineering Statistics and Facts

IEEE Standard 493 (Gold Book)

clearly state that 50% to 70% of failures in electrical distribution systems (specifically regarding switchgear and transformer connections) are caused by inadequate maintenance of connections or loose connection points, which lead to heat accumulation.

Report on Industrial Insurance Statistics

Most damage in MDBs and transformers does not originate from an immediate internal insulation failure; rather, it begins with heat generated at loose connections, which leads to arcing and escalates into an explosion.

Engineering Fact: In dry-type transformers, external busbar connections are highly vulnerable;
thermal cycling caused by the expansion and contraction of metal in response to load fluctuations can lead to loosening over time.

Micro Thermal Tag Sensor

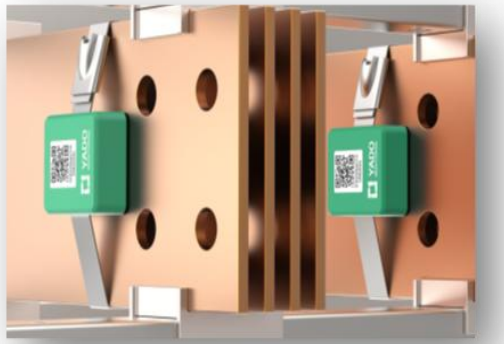
Self-Powered Technology: Automatic current induction (3.5A – 10,000A); maintenance-free, battery-less operation throughout its lifespan.

Ultra-Compact & Durable: Compact size of just 24 mm and weighing 9 g; easy to install in confined spaces using a metal strap.



High-Precision Sensing: Measurement range: -40°C to +150°C; accuracy: ±1°C; rapid measurement every 5 seconds.

Wireless Performance: Transmits 2.4 GHz LoRa digital signals with a range of 150 m (30–50 m with obstacles).

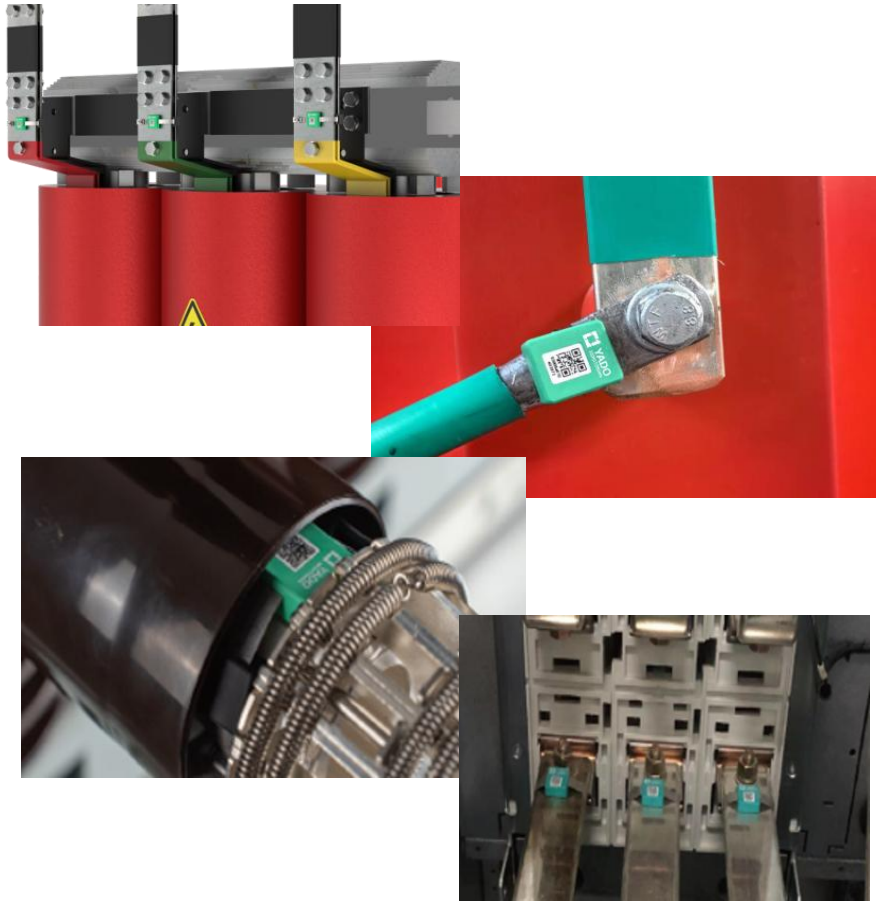


Extreme Protection: IP68 water and dust resistance, IK07 impact resistance, and flame-retardant material (960°C).

จุดติดตั้งเฝ้าระวังอุณหภูมิวิกฤต

- High-voltage (HV) busbar connection point
- High-voltage coil end
- Low-voltage (LV) busbar connection point
- Medium-voltage cable termination
- Medium-voltage circuit breaker contacts
- Low-voltage feeder busbar

Easy to install using stainless steel straps; resistant to vibration and high heat buildup.



Safety Standards and Testing (Type Test)

Passed international standard Type Tests (IEC 62271) for high-voltage electrical systems.

75 kV

Impulse Test

Withstands lightning impulse voltages up to 75 kV.

80 kA

Short-Circuit Test

Withstands a peak short-circuit of up to 80 kA.

≤ 50 pC

Partial Discharge

Passed partial discharge testing at 13.2 kV.

Long-term Durability

Long service life > 20 years

(Storage 0–100% RH)

2 Years Warranty

Rest assured with a full 2-year product quality warranty.

PP3000 Panel-Mounted Monitoring Unit

- **Real-time Display & Bluetooth:** View temperature readings instantly on your mobile screen via Bluetooth.
- **Wireless Configuration:** Change parameters, temperature, and IP address via the application.
- **Dual RS485 Interfaces:** Two isolated RS485 ports supporting the Modbus RTU standard.
- **SCADA & Cloud Connectivity:** Connect the gateway to transmit data to the cloud and the factory SCADA system in real-time.
- **High-Speed & Reliable:** Maximum baud rate of 115,200 bps; electrical ground isolation to prevent signal interference.



Proactive Alert and Analysis System (Advanced Alarm)

Relay Output Control

It features a dry contact port that transmits a signal to cut off the power supply or immediately activate an alarm siren when a critical temperature is reached.

Non-volatile Memory

Accurate notification history of 256 entries; log data and configuration settings are preserved even during power outages.

Hourly Trend Curves

Record and plot hourly maximum temperature trends to analyze and promptly detect electrical load anomalies.

System / Connectivity Overview

End-to-End Monitoring Architecture

Wireless Sensors: Measure contact temperature and transmit a 2.4GHz LoRa signal.

Receiver / Gateway: Receive wireless signals and convert protocols between Modbus and IEC61850.

SCADA / PMS Integration: Connect the factory's central control system.

Multi-device Cloud App: View dashboards, receive notifications, and review historical data via PC, tablet, or smartphone.



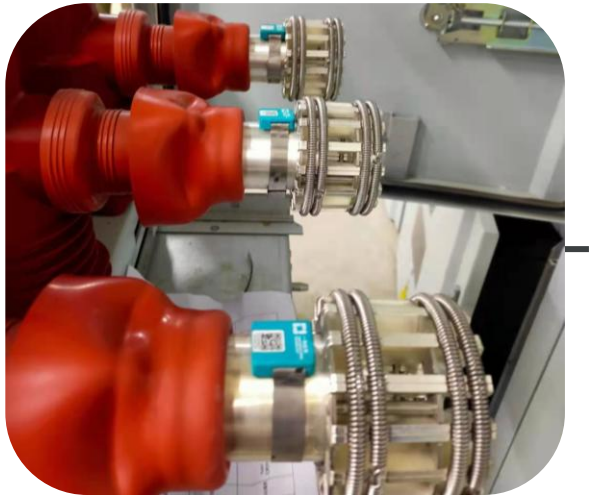
Wireless Range



150 meters

For open areas





50 meters

For indoor use

with obstacles present



Sensor

Control Box



SCADA / Phone

Standard Protocol

Modbus/IEC104/61850...



Receiver /Concentrator/ Gateway

2.4GHz LoRa



Wireless Self-powered Sensor