

# SF<sub>6</sub> LEAK DETECTION IN ENCLOSED GIS SUBSTATIONS



High-voltage SF<sub>6</sub> Gas-Insulated-Switchgears (GIS) are solutions more and more privileged by T&D operators in need for compact and enclosed substations.

## The Challenge

*Direct leak detection in enclosed GIS substation requires highly sensitive and reliable SF<sub>6</sub> gas detection.*

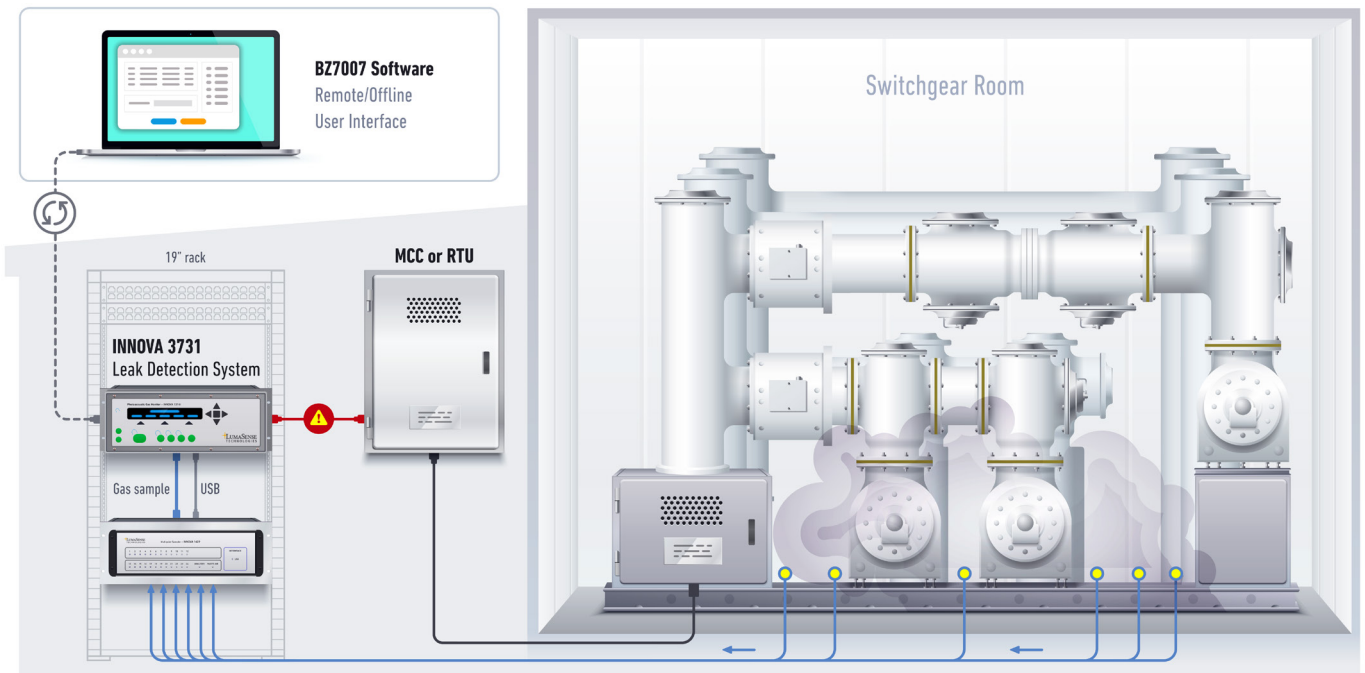
GIS insulated switchgear require specific operation & maintenance procedures to prevent and limit the emissions of the insulating gas (SF<sub>6</sub> – sulfur hexafluoride), which is a very potent greenhouse gas.

New regulatory frames like the F-Gas Directive (EC 517/2014) are mandating the use of leak detection systems in the vast majority of GIS insulated switchgear installation in order to better mitigate the risk of SF<sub>6</sub> emissions.

Indirect leak detection solutions are rapidly expensive as they require one monitoring device per

gas compartment. Furthermore, the pressure/density switches that are currently used to monitor the SF<sub>6</sub> gas compartment for safety consideration are lacking sensitivity for rapid leak detection.

Direct detection is normally a preferred and more reliable method as it relies on measuring trace concentration for leaking gas in the ambient air. However, incumbent SF<sub>6</sub> room monitors have detection limits around 1 ppm that is higher than the expected SF<sub>6</sub> concentration range in a normally ventilated indoor substation (in the 10-100 ppb range).



The 3731 leak detection system can be installed in the local control room. Sampling lines (up to 24) will easily be laid out using existing control cable ducts or trenches. The sampling points are ideally distributed underneath the circuit-breaker bays (additional sampling points can be located in ventilation extract). Alarm relays are connected to the substation RTU.



SF<sub>6</sub> Leak Detection System - 3731



LumaSense's SF<sub>6</sub> leak detection system is a cost-effective solution to comply with SF<sub>6</sub> emission regulations.

## Our Solutions

Our leak detection solution, based on Photoacoustic Spectroscopy (PAS), is field-proven in several applications and was perfected for SF<sub>6</sub> leak detection. The PAS technique is highly accurate and reliable.

### Ultra-high Sensitivity:

With its very low detection limit (6 ppb SF<sub>6</sub> in ambient), our 3731 system is a direct leak detection solution capable of integral monitoring of large switchgear rooms. It verifies that your GIS equipment operates below the industrial target of 0.5% yearly leakage rate or better.

The 3731 system can automatically detect any excessive increase in the leak rate with short response time. It enables a decrease in the number of periodic manual leak checks, hence the cost.

### Multi-Point Sampling:

With up to 24 different channels, the 3731 system enables an extensive distribution of sampling points over the whole monitored substation in order to maximize the coverage area and minimize the detection response time. Each sampling line (nylon tubing) can be extended up to 75 m.

### Reliability:

The detection system has extended self-test routines which maintain the reliability of the results. Besides, our stable PAS design only requires calibration once per year.

### Detection Trending - Automatic Alarms:

Analog output is available for detection trending over time. Measurements are also stored in the internal memory and can be exported to a remote LAN computer. Finally, configurable zone alarms can be relayed to a local RTU.

## Your Benefits

- ✓ Cost-effective and reliable solution for integral leak detection
- ✓ Superior sensitivity to detect SF<sub>6</sub> leaks, even in large indoor substation rooms
- ✓ Simple installation procedure, non-intrusive, not requiring any outage on your installation
- ✓ Low maintenance needs. Calibration only required once a year
- ✓ Direct detection method, independent from any pressure or density reading
- ✓ State-of-the-art photoacoustic technique as referenced in CIGRE's #406 bulletin "SF<sub>6</sub> Tightness Guide"



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