



DECEMBER 2020 | Application Note

Application Note: Using Touchless Inspections to Avoid Outages and Time On Site

The Problem

On site inspections cost utilities time, travel and often require outages to make sure the inspection can be done safely. Transformer connections are often in spaces that are difficult and dangerous to access. High voltage connections that are not tightened correctly can heat up and fail over time. Thermal inspections can detect faulty connections and aging insulation but are only useful on live systems with current passing through. For connections that are enclosed, outages must be scheduled for the inspection that is both costly in terms of time and taking the outage. Since power must be removed, the thermal inspection cannot be done under load and that may miss the fault condition. Due to the difficulty and cost, these inspections cannot be done on a regular basis.

Background

At this utility, thorough periodic substation inspections are performed that include the enclosed connections on the low side of the transformer. To do this inspection, the transformer must be powered down and temporary alternate power trucked in. The enclosure is accessed through a bolted hatch to enable the technician to visually inspect the connections. The connections cannot be thermally inspected since there is no current flowing through the connection points. Due to the time and expense required, this inspection is performed on an infrequent basis, opening the possibility of missing problems that can lead to more expensive failures and outages.

The Solution

The IM500 Switch Module is an IoT sensor with onboard thermal and visual imagers and built in wireless communications. An IM500 takes temperature readings on live systems and will detect overheating bushings, cables, joints and insulators – even in enclosed and confined spaces. Due to its small size and low power requirement, the IM500 can be installed quickly using high powered magnetic mounts to keep the unit in place.



Figure 1 - Low side connections on this transformer are not easily accessible



Figure 2 - IM500s installed inside the connection enclosure

The IM500s are pre-programmed to take snapshots that give operators a visual and thermal view of the inside connections. The thermal data is collected, stored and analyzed on a continuous basis. The Systems With Intelligence dashboard provides a comprehensive view of the data providing graphs of the temperature points along with visual and thermal images. Alarms can be set in the dashboard so operators are alerted instantly if temperatures exceed the pre-set thresholds. The data and alarms can be sent to SCADA or PI systems through the Systems With Intelligence ISG500 Sensor Gateway, allowing the utility to trend the data and use it in a condition-based maintenance program.

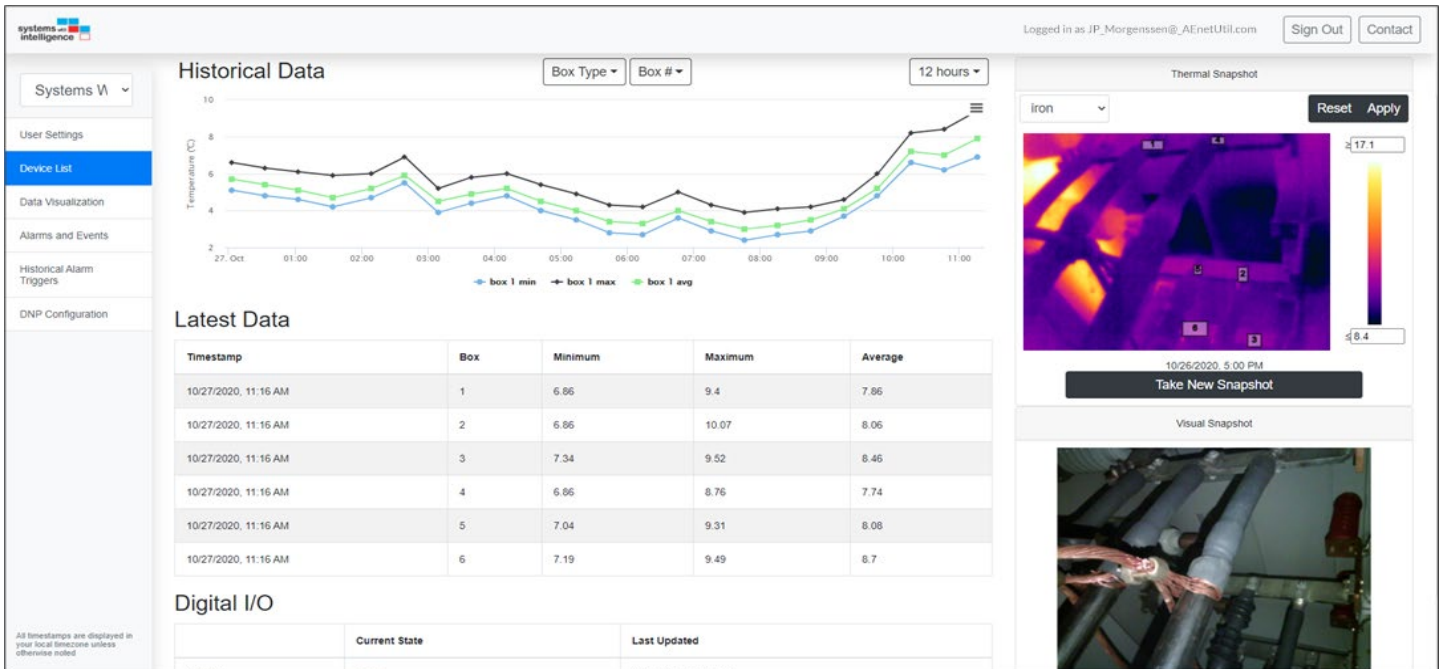


Figure 3 - Comprehensive dashboard provides status, trending and visualization information

Summary

The IM500 allows this utility to perform Touchless Inspections, with 24/7 monitoring on sites and equipment that would otherwise be difficult and costly to inspect. The IM500 provides visual and thermal imaging of the enclosed connections without sending personnel to site and without taking an outage. The IM500 installs quickly and easily due to its small and lightweight form factor, low voltage requirements and built-in communications. Temperature data is sent to SCADA or PI applications for further analysis, trending and input to asset management applications. Continuous thermal monitoring ultimately improves utility safety and reliability while reducing operating costs.

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