

APPLICATION NOTE

Infrared inspections for power transmission and distribution applications

Today's public and private utilities in the developed world face a number of challenges. The components of the power grid are getting older and need regular predictive maintenance (PdM) to keep them running efficiently and to avoid costly and dangerous failures. Utilities are running with leaner crews so staff technicians are stretched to their breaking points. A steady stream of widespread weather-related outages take their toll on the aging power network and are challenging utility crews to keep up with repairs.

As a result, the need for PdM is growing and the resources to perform it are decreasing. Still, it is necessary to conduct regular inspections of all aspects of the power network quickly and accurately so that potential problems can be addressed before they become actual problems. At the same time, utilities need to meet increasingly rigorous safety standards for inspecting all phases of the power system. The tools they use for those jobs need to support the safety standards and be intuitive and versatile to keep training costs down and maximize the value of each tool added to their toolbox.

One tool for many utility applications

One tool that can help utilities meet all those objectives is a handheld thermal imager. Thermal imagers allow you to capture two-dimensional representations of the apparent surface temperatures of electrical components and other objects without touching those surfaces and without interfering with target systems. The images from that testing can help you identify problems before they do a lot of damage.



However, not all thermal imagers are created equal. The new Fluke TiX560 and TiX520 thermal imagers—from the Fluke Expert Series line—are ideal for utility applications because they allow you to work from a safe distance and easily inspect objects that are overhead with the full 180 degree articulating lens. They go wherever you go—from inspecting transmission lines, to scanning live substations on foot, or climbing down into a cramped transformer vault.

Top THREE

Utility inspection applications For expert series thermal imagers

1. Transmission line inspections
2. Substation or switchyard inspection
3. Vault inspection and troubleshooting

Expedite PdM and troubleshooting

These Fluke Expert Series thermal imagers with their high resolution images, long distance accuracy, advanced focus system and the largest 5.7 inch touchscreen LCD are suited to the challenges of transmission and distribution applications including;

Transmission line inspections

Loose contacts, corrosion, or internal defects in fittings and weakened or failing cable splices often cause hot spots that pose serious hazards to the integrity of a power transmission system. In areas subject to high winds and frequent wildfires this can have catastrophic consequences.

That's why utility companies are vigilant about inspecting their transmission assets to find hot spots before they can cause disasters.

More diagnostic information

The more detail you can see in an infrared image, the more information you have to work with. These Fluke Expert Series thermal imagers along with a 2x or 4x telephoto lens give you both detail and information.

These Fluke Expert Series thermal imagers help to deliver high resolution images and radiometric information at a safe distance with less hassle. Using the Fluke TiX thermal imagers with a telephoto lens you can scan miles of transmission lines, using gray scale to locate hot spots, and zooming in



Fluke TiX560 and TiX520 thermal imagers provide the first line of defense

- 1 **Ergonomic 180° articulating lens** gives you maximum flexibility and makes it easy to navigate over, under, and around objects so you can see the image before you capture it. It allows you to verify that the image is in focus before you record it, unlike a pistol-grip camera that can be very difficult to focus when you're in an awkward position. This allows technicians to work in more ergonomically agreeable positions for all day use.
- 2 **The only 5.7 inch responsive touchscreen** in its class¹ delivers 150%² more viewing area to make it easy to see even subtle changes and details right on the camera. Quickly finger scroll through saved thumbnail images on the screen, zoom in and out, and access shortcuts to save time and increase productivity.
- 3 **Enhanced image quality** and temperature measurement accuracy allow you to increase 320 x 240 images to 640 x 480 in SuperResolution mode to find subtle anomalies faster.
- 4 **LaserSharp® Auto Focus** at the touch of a button takes the guesswork out of precision focus. The built-in laser distance meter calculates the distance to your designated target and then automatically focuses to produce the optimum image.
- 5 **Filter mode** achieves Noise Equivalent Temperature Difference (NETD) as low as 30 mK to detect very slight temperature differences.
- 6 **Hot and cold spot markers** highlight the hottest and coldest pixels on the image and displays their temperature values at the top of the screen for quick identification of anomalies.
- 7 **On-camera storage, editing, and analysis** allow you to store thousands of images in memory and bring them up in the field to edit, add digital images, text or voice annotations, and analyze right on the camera.
- 8 **Fluke Connect®** wireless compatibility enables you to see, save, and share live video, still images, and measurements with team members who have the Fluke Connect® mobile app on their smart phones. Just push the shortcut button to connect.

¹Compared to industrial handheld thermal imagers with 320x240 detector resolution as of October 14, 2014.

²Compared to a 3.5 inch screen.



Figure 1: High voltage power pole, captured with a TiX560 camera and standard lens.

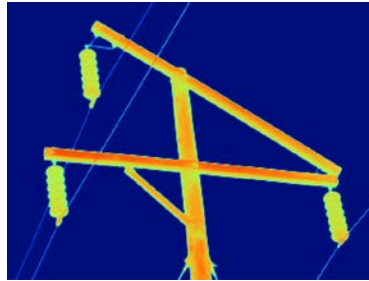


Figure 2: The same power pole captured from the same distance as in Figure 1, but with a Fluke 2x telephoto lens.

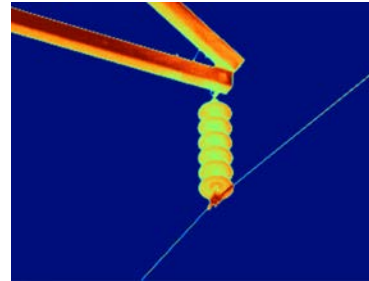


Figure 3: The right hand connection point captured from the same distance as in Figure 1, but with a Fluke 4x telephoto lens. The 4x telephoto lens gives you the level of detail needed to verify whether you have a possible issue or if maybe it's just a reflection, as in this case.

on suspect locations to collect high resolution infrared images with radiometric data from a safe distance. Both the TiX560 and TiX520 have LaserSharp® Auto Focus which uses a built in laser distance meter to ensure you are focusing where you intend to. You can inspect fittings and splices from the ground, using a TiX560/520 thermal imager with a telephoto lens and zoom in with the 4x zoom lens anywhere that you see an anomaly.

You can combine a digital visible light image and infrared image with Fluke IR-Fusion® technology to provide visual context for locating suspect components. You can also make text or voice annotations to add more details or location information. The removable SD card stores thousands of images which you can forward on to the supervisor back in the office for further analysis and reporting. On camera analytics save you time by allowing you to adjust the emissivity, reflective temperature compensation, transmissivity, level and span, and palette directly on the camera to ensure you have the best image possible in the field.

Substation or switchyard inspection

Substations and switchyards have many complex electrical systems and equipment that handle very high voltage. Keeping this equipment running safely and efficiently is critical

because a failure can lead to lost production revenue for end users and lost sales revenue and liability issues for a utility company.

Keeping substations and switchyards online requires regular PdM to isolate conditions that indicate impending failure. Thermal imagers combined with the skills of an experienced inspector provide the predictive capabilities to fill this role well because overheating or abnormally cool operating temperatures may signal degradation of an electrical component. A substation transformer can cost hundreds of thousands of dollars so keeping just one from being destroyed could more than pay for the thermal imager.

Here again, these Fluke TiX Series thermal imagers provide an extra measure of accuracy and safety. You can perform the initial scan of the exterior of the substation from a distance and the 180 degree rotating lens provides a clear view of your target. You can move quickly through the components, scanning the transmission line feeding the station, the circuit from the transmission line, high side insulators (arrestors) and bushings on the transformer, and the regulators. If you see something that appears to be an anomaly, attach a 4x telephoto lens to quickly see the detail and determine if further investigation is required. Moving

inside the perimeter you can inspect the bus work and its bypass switches for hot spots.

Save time and money and eliminate trips back to the office to find the detail you need in post image processing software. Turn your 320x240 images into 640x480 images directly from the field with the TiX560 on camera SuperResolution. Then you can use the images and measurement data collected to create a professional report to document your findings.

Vault inspection and troubleshooting

Transformer vaults are typically crammed full of equipment and located below ground level, which makes them difficult to access and even more challenging to safely troubleshoot and maintain. However, PdM is absolutely necessary because failure within a vault can be costly, dangerous and a very visible mark against a utility's reputation.

¹Compared to industrial handheld thermal imagers with 320x240 detector resolution as of March 14, 2015.

Multiply your resources with Fluke Connect® wireless capabilities

With the Fluke Connect mobile app you can transmit images and measurements from Fluke Expert Series thermal imagers in real-time to any smart phone that has the Fluke Connect mobile app. That makes it easy to share results with team members because everybody on the ShareLive™ video call can see the same images and measurements remotely that you're seeing on site*. That can help you get approvals on the spot and expedite repairs.



You can also save images and measurements from your smart phone to EquipmentLog™* history in secure Fluke Cloud™ storage for easy access by all authorized users. In that way you can compare real time measurements to baseline data to identify problems and make better decisions faster.

You can also use SmartView® software included with all Fluke thermal imagers to document your findings in a report that includes thermal images, visible light images, and blended images to communicate problems you find and to suggest repairs.

Fluke Connect® is not available in all countries.
*Within providers wireless service area.

See what you're missing

The common requirements for all of these applications are clear image resolution, temperature accuracy, speed, and flexibility to get high resolution images in areas that may be hard to reach. Those are the very capabilities that set these Fluke Expert Series TiX thermal imagers apart.

To find out more about how these versatile, high resolution, high accuracy cameras can help utility companies keep the power up and running smoothly, consult your Fluke sales representative.

Fluke. *Keeping your world up and running.®*

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