A BUYER’S GUIDE TO THERMAL IMAGING

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Thermal imaging for industrial use has been around for a lot longer than many people realise. Inspection of electrical substations was one of the first applications for the technology, even though it was a cumbersome and complex process, and that was back in the 1980s. Today, a thermal imaging camera has become an indispensible tool across the electrical trades thanks to electronic advancement using smaller components, improved ergonomics and friendlier user interfaces.

Wide adoption of the technology has also seen a massive drop in price too. Entry level is now around the £895 and this presents electricians with a great opportunity to introduce infrared into their daily routine. However, before taking the plunge there are several important factors that need to be considered.

Dave Blain is the Managing Director of Thermascan, a company that undertakes surveys, hires out and sells FLIR infrared cameras and trains would-be thermographers. He says: “To conduct a meaningful thermal imaging survey, the basic requirement is your qualification as a 17th edition electrician. Without this fundamental knowledge, it is impossible to determine if the thermal values on the image indicate normal operating temperatures or a potential fault.”

The problem needs to be put into context as not everything showing hot is a fault. For example, is there a high current or high resistance contact where a high operating temperature may be the norm? “And it is also vital that you have a thorough grounding in the principles of infrared,” Dave continues. “Basic training is an absolute must for anyone planning to use infrared.”

Reflections from cabinets and background lighting can completely skew the results. A cabinet may be glowing hot in the thermal image but its shiny surface could just be the heat from overhead lighting or indeed the body heat generated by the camera-operator. Busbars and DIN rail connectors can often cause problems, as can different surface coatings.
It’s all to do with emissivity, the term that describes the ratio of emissive power of a surface at a given temperature to that of a black body at the same temperature and with the same surroundings. Values range from 1.0 for lampblack down to 0.02 for polished silver. And in most cases the infrared camera readings need to be adjusted to take this emissivity into account.

Selecting the most suitable camera for the job is also critical and that’s down to what the user wants to do with infrared. The introduction of the compact, torch-style infrared camera has seen the infrared market expand significantly. “These are great toolbox instruments,” Dave explains. “They are ideal troubleshooting and checking tools, for doing a quick scan for hotspots and for proving that you have repaired the electrical fault correctly.”

He continues: “However, if you need a camera that provides the necessary information for you to diagnose a broad range of electrical and mechanical faults, you need to move up the range.” And Dave’s advice is definitely to try before you buy or hire different camera models to try them out in the field.

There are two key factors when considering the best infrared model for detecting electrical faults – clarity of image and operational safety. Dave adds, “Both are best served by a camera with a minimum 320 x 240 pixel array. This gives the adequate number of measurement points on an image to provide a typical sensitivity value of 50 – 80mK.”

To stand a chance of diagnosing a fault with a less sensitive camera means you have to stand closer to the subject. “And this is where safety can be compromised. An electrician needs a clear image of the problem at a good safe distance,” Dave explains. “To use infrared to discover a range of problems you need the flexibility of at least a mid-range camera, a FLIR T-Series would be the level I would recommend. Quite simply, there is no point in buying a low-price, low resolution troubleshooting camera that can only give you a clear image for fault diagnosis when it’s six inches away from the target!”

These higher specification cameras also have a range of standard features to make it even easier to apply infrared. For example, they will have a resolution of around 50mK, include a high quality digital camera and the ability to overlay digital and thermal images to emphasise any temperature abnormality. Interchangeable optics are also highly valuable as they allow the camera to be best adapted to the task, as does a tiltable screen for applications such as examining the health of busbars in a chamber.

Dave Blain summarises, “Just make sure the scope of your thermal imaging camera matches the scope of your job and invest in some dedicated training. That way infrared will certainly add value to the service you provide and keep you safe in the process.”

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