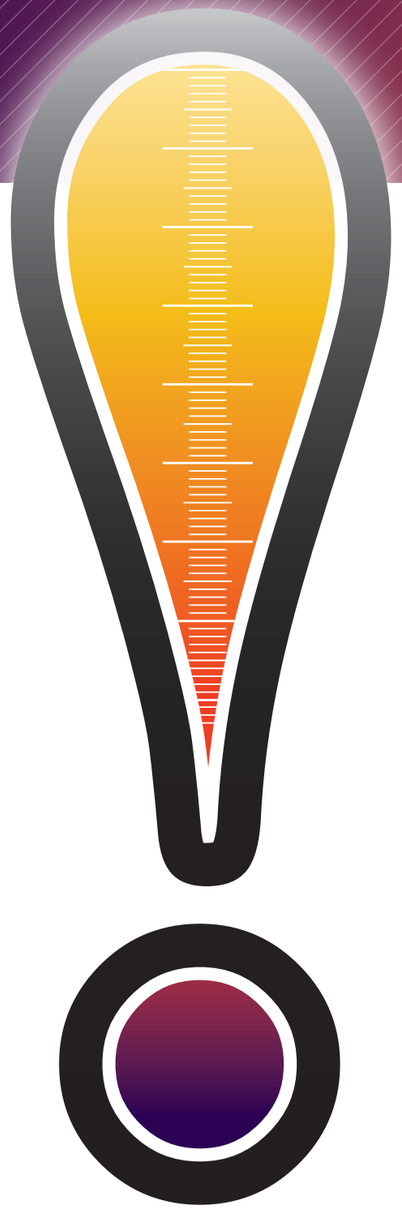
A risk-based approach to thermographic surveys on electrical devices



THERMOGRAPHIC SURVEYS ARE AN ACKNOWLEDGED MEANS OF IDENTIFYING DEFECTS IN ELECTROMECHANICAL EQUIPMENT. BUT NOT ALL SURVEYS ARE THE SAME.

Dave Manning-Ohren
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Just like normal photographic cameras, there are many different thermographic cameras on the market. But, as with normal cameras, it's not only the quality of the equipment but also the expertise and experience of the person operating it which makes all the difference. So whether you have your own low-end thermographic camera operated by a non-certified thermographer or you hire in a thermographer with a better camera, you're in the same situation as someone who gets their friend to take their wedding photos with a 'happy snapper' camera. You'll get results, but will they actually show you anything? Cameras 200x200 pixels and below cannot generally give a quantitative thermal image as there are not enough pixels in the defective area, they will detect most defects but the cameras are limited.

What is actually required is a company with extensive experience in thermography, with the best thermography equipment available, and with operators who are far more than just highly-qualified thermographers.

ERIKS Industrial Services has being using high-end thermographic cameras for over thirty years. All cameras used are high resolution, calibrated and serviced annually, and operated by thermographers certified competent to ISO18436 – providing reassurance should an audit trail be needed.

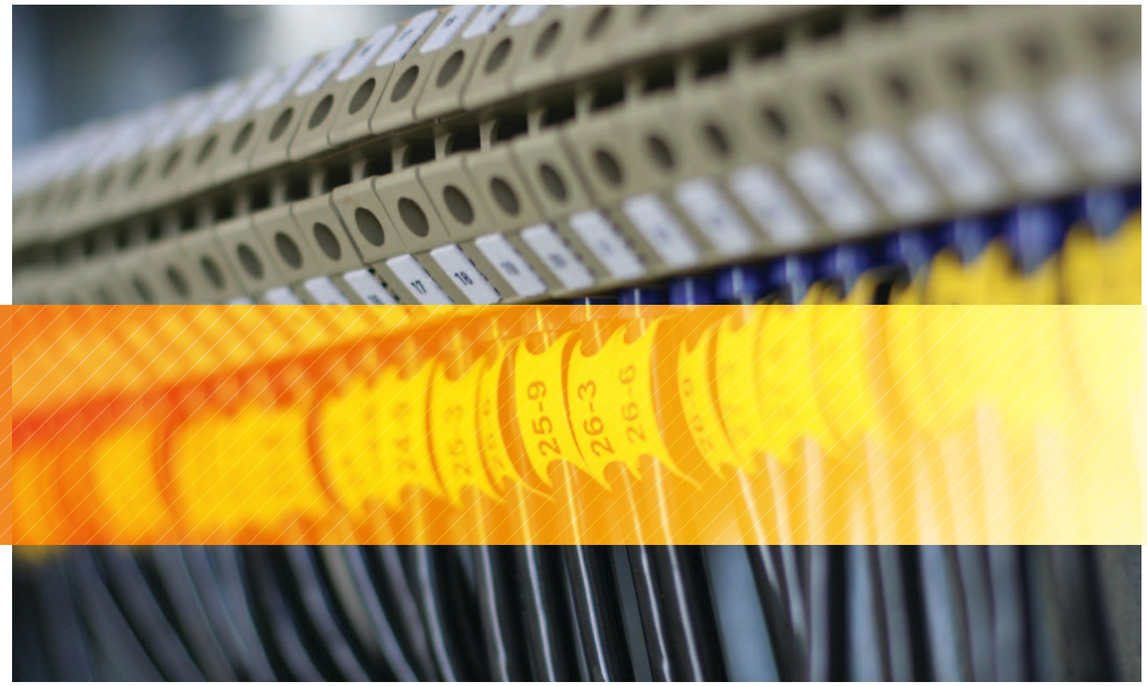
You can supplement these surveys with your own intermediate checks with a low-end camera, and ERIKS cannot only supply these cameras but also mentor and advise your operators on the best way of applying the technology on-site and the pitfalls they may encounter. Additional mentoring can also be provided during ERIKS own thermographic surveys, which will complement your own checks.

ERIKS' thermographic consultants cannot only conduct the surveys but also – thanks to their wider electromechanical expertise – can analyse and interpret results, make recommendations on ways to resolve any problems or defects, and advise on preventing a recurrence, by looking at the bigger picture within your plant. They also have the advantage of being backed by one of the leading and most innovative names in thermographic surveying.

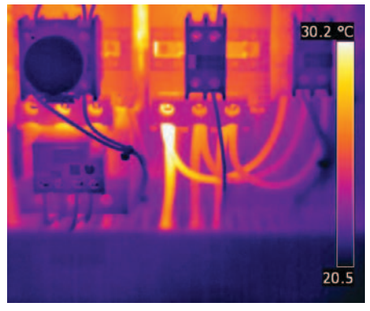
ERIKS continually develops new advances in thermographic surveys, such as a severity calculation which is now applied to all customer surveys.

When a fault is detected, customers often ask for an assessment of its severity. There are several variables required to enable accurate severities to be attributed to faults – such as the exact load cycle of the machine and the future ambient temperature. A thermographer cannot know all of these at the time the fault is found, so ERIKS' thermographers work to the severity chart (page 33) developed by ERIKS and based on ISOs and over twenty-five years of electromechanical thermography know-how.

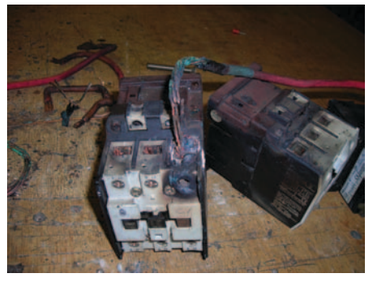
Firstly a datum temperature is established for what the defect should be running at. This is then mathematically compared to the defect and ambient temperature. The result is reference to a severity table and entered onto the thermographic exception report sheet as well as the plant-listing trend report.



The importance of identifying severity is demonstrated by the images below. These show the thermographic image from a survey (not conducted by ERIKS) and the result of the subsequent failure – just two weeks later.



The customer took no action on the thermal exception, believing 30.2°C was not an issue. However, using the ERIKS severity calculation, a defect of 250% is revealed!



Only by using ERIKS' severity formula – taking into account the temperature rise of the defect to ambient, together with the temperature rise that should have occurred to ambient – does a true picture of severity emerge.

SEVERITY	1 – TEMPERATURE	2 – TEMP RISE WITH RESPECT TO DATUM	3 – TEMP RISE WITH RESPECT TO DATUM'S RISE
1	> 80%	> 30%	> 100%
2	60% TO 80%	20% TO 30%	66% TO 100%
3	40% TO 80%	10% TO 20%	33% TO 66%
4	< 40%	< 10%	< 33%
5	IMAGE TAKEN FOR REFERENCE ONLY – NO ACTION NEED TO BE TAKEN		

This clearly demonstrates that a basic thermographic survey – whether with an in-house camera operator or an external thermographer – is not enough to identify defects before they lead to failures, downtime and loss of production. However, combining these with ERIKS' surveys can ensure that you can commit resources to the most problematic areas of your plant to ensure the avoidance of failures.

The frequency of the ERIKS' surveys will depend on a number of factors unique to your plant: hours run, starting method and stresses, ambient temperature of equipment, plant criticality etc. Typically, a full thermographic survey of electromechanical items will begin with the main incomer, then the motor and machine control centres. In ERIKS' experience, the equipment where most problems arise is the motor control centre – mostly those with high ambient temperatures, high changes in ambient temperatures, a high amount of switching operations, and which are subject to vibration or contamination. Across the ERIKS' client base, quite severe defects have occurred where the frequency of survey of these areas is less than quarterly, whereas motor control centres outside these problem areas are usually safe to survey every six months.

As most distribution equipment rarely falls into the extra risk category above, an annual survey is normally the correct balance. However, if a trip or new installation occurs a survey as soon as possible is recommended, together with an altered survey frequency until the site duty holder is happy with the findings.

To assess the required frequency to maintain the uptime, reliability and productivity you demand from your plant, simply talk to ERIKS Industrial Services about thermography, risk – and how to minimise it.