

Thermal cameras



Detect **hot spots** before
they cause trouble

Thermal imaging

Detect hot spots before they cause trouble

Since the dawn of the industrial age, temperature has been used to give an indication of machine condition. Technicians know that abnormal temperatures often indicate a potential problem. Depending on the situation, sometimes just feeling the machine with the back of your hand can help you determine if the temperature is within acceptable limits; of course this method has severe safety limitations especially with rotating machinery and electrical equipment!



Possible benefits of thermography:

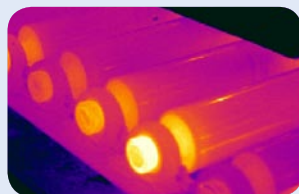
- A proactive, non-contact and non-invasive inspection technique, which is often well suited as part of a predictive maintenance programme
- An easier, faster and safer method of early fault condition detection
- Inspection, over time, of equipment under same running conditions, allowing thermal anomalies to be easily detected
- Inspection of running equipment under full load, minimising production interference
- Inspection of difficult to access live electrical equipment
- Reduction of production losses due to unplanned downtime, thus increasing productivity and profitability
- Reduction of time necessary for planned shutdown
- Reduction of maintenance and repair costs
- Increased equipment lifetime and mean time between failures (MTBF)
- Increased availability and reliability of plant

To obtain a more quantifiable indication of temperature, direct contact thermometers are often used; a safer method than using the back of your hand, but with some similar safety concerns. Infrared thermometers are often used for hazardous and difficult to access applications.

However, infrared thermometers measure the average temperature of an area and, for accurate measurements, the user often has to be close to the application. Thermography allows you to visualise heat. The application's infrared radiation is converted by a thermal camera to a visual image.

The different temperatures are indicated as different colours or shades of grey. Thermal cameras allow temperature comparisons over a large area, allowing potentially troublesome hot spots to be found quickly. If cost of the thermal camera is offset against savings in reduced downtime and maintenance costs, generally a short payback period is realised.

Overheating conveyor bearing



Distribution line faults



The TKTI series of SKF Thermal Cameras consists of three user-friendly models with extensive thermal imaging capabilities. With a common user interface, they allow maintenance technicians to visualize troublesome hotspots quickly and easily. For experienced thermographers, the feature rich TKTI range allows many possibilities in analysing and visualising the scene.

SKF Thermal Cameras capture both digital and fully radiometric thermal images, which can be blended together, allowing the scene to be easily interpreted and analysed. Images stored on the camera's SD memory card can easily and quickly transferred to a PC, for further analysis or report-writing using the powerful software suite provided.



TKTI 10

- Easy hotspot detection and pin pointing at close distances
- Wide temperature range with alarm functions
- Rechargeable battery with up to 6 hours continuous use

TKTI 20

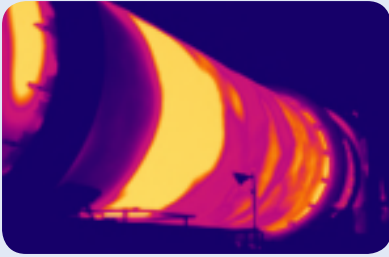
- Four modes enable temperatures between $-20\text{ }^{\circ}\text{C}$ and $+900\text{ }^{\circ}\text{C}$ to be displayed
- High thermal sensitivity display temperature differences quickly and easily
- Advanced display options available for experienced thermographers

TKTI 30

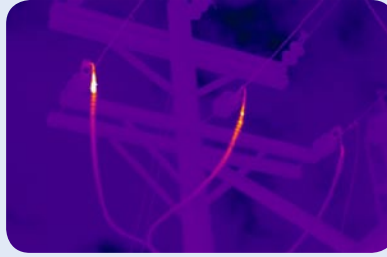
- High resolution thermal imaging capability
- Advanced image fusion capabilities
- Suitable for many thermal imaging applications at far distances

	TKTI 10	TKTI 20	TKTI 30
Bright, backlit, 3.5 in. landscape format screen	✓	✓	✓
Laser pointer & LED illuminator	✓	✓	✓
Temperature difference of two spot temperatures displayed on screen	✓	✓	✓
Audible and visual temperature alarm function	✓	✓	✓
Automatic picture taking on alarm or at regular intervals	✓	✓	✓
Isotherms, temperature gradients and area analysis box function	✓	✓	✓
Number of movable spot cursors	2	4	4
Spot temperature cursors with individual emissivity settings		✓	✓
8 different user-selectable colour pallets	✓	✓	✓
Images can be voice and text annotated	✓	✓	✓
Automatic hot and cold spot cursors with audible and visual temperature alarm function	✓	✓	✓
Multilingual menus with built-in emissivity tables	✓	✓	✓
Full screen image with customisable display		✓	✓
Four application measurement modes: Standard, Building, High and Extended		✓	

Typical applications



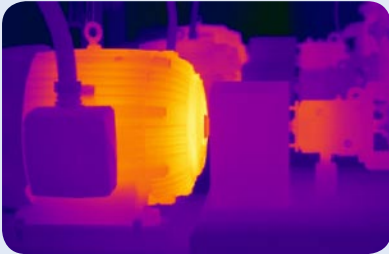
Damaged refractory lining



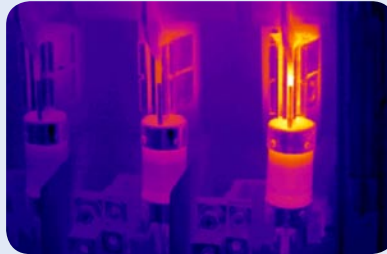
Distribution line faults



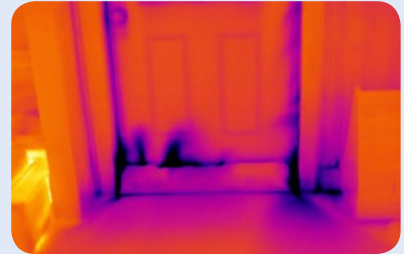
Air exfiltration



Overheating motor



Faulty fuse connection



Cold air leaks

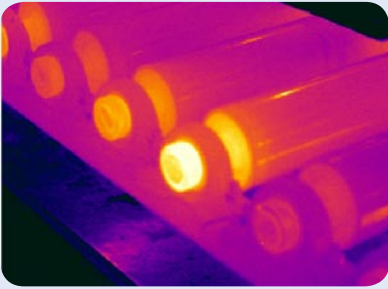
Note: pictures are for illustration purposes only

	TKTI 10	TKTI 20	TKTI 30
Bearings and housings	✓	✓	✓
Belt and chain drives	✓	✓	✓
Conveyor belt bearings	✓	✓	✓
Coupling alignment	✓	✓	✓
Heat exchangers	✓	✓	✓
HVAC		✓	✓
Loose bolts			✓
Pipe insulation		✓	✓
Pumps	✓	✓	✓
Refractory insulation		✓	✓
Steam traps		✓	✓
Tank levels		✓	✓
Valves		✓	✓
Welding robots		✓	✓
Electric motors, inc junction boxes	✓	✓	✓
Electrical cabinet inspections		✓	✓
Electrical connection problems, inc unbalanced loads, fuses and overload		✓	✓
Power line connections			✓
Power lines			✓
Powerline capacitors			✓
Transformer bushings			✓
Transformer cooling and electrical		✓	✓
Buildings - indoors - insulation, moisture		✓	✓
Buildings - outdoors - moisture, heat, insulation, energy audits, roofs		✓	✓

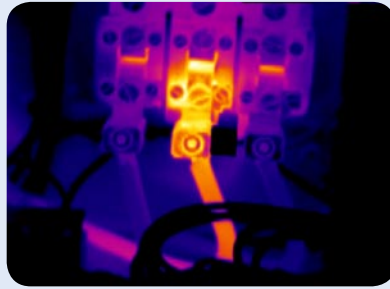
Technical data



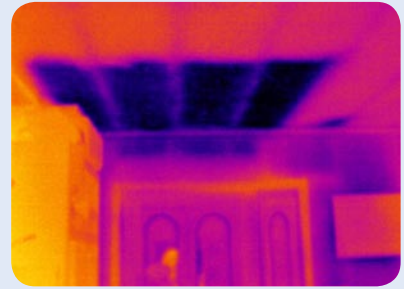
Designation	TKTI 10	TKTI 20	TKTI 30
Performance			
Temperature range	-10 to +350 °C (14 to 660 °F)	-20 to +900 °C (-4 to +1 650 °F)	-10 to +250 °C (14 to 482 °F)
Field of view (manual focus)	20 × 20°	20 × 15°	21.4 × 16°
Sensitivity	~0,3 °C at 30 °C (86 °F)	~0,08 °C at 23 °C (73 °F) ambient and 30 °C (86 °F) scene temperature Building mode: ~0,05 °C at 23 °C (73 °F)	~0,08 °C at 23 °C (73 °F) ambient and 30 °C (86 °F) scene temperature
Thermal detector / digital camera	47 × 47 pixel array (interpolated to 180 × 180) / 2 Megapixel digital camera	160 × 120 uncooled microbolometer / 3 Megapixel digital camera	320 × 240 uncooled microbolometer / 3 Megapixel digital camera
Emissivity correction	User selectable 0,1 to 1,0 in steps of 0,01.	User selectable 0,1 to 1,0 in steps of 0,01 with reflected ambient temperature compensation.	User selectable 0,1 to 1,0 in steps of 0,01 with reflected ambient temperature compensation.
Accuracy	The greater of ±2 °C or ±2% of reading in °C	The greater of ±2 °C or ±2% of reading in °C for the ambient temperature range of -15 to +45 °C (5 to 113 °F)	The greater of ±2 °C or ±2% of reading in °C for the ambient temperature range of -15 to +45 °C (5 to 113 °F)
Frame rate	8 Hz	8 Hz	8 Hz
Image storage	Up to 2 000 images on Micro SD card supplied	Up to 1 000 images on Micro SD card supplied	Up to 1 000 images on Micro SD card supplied
Display	3.5 in. colour LCD with LED backlight 8 colour palettes Mixed thermal and visual images	3.5 in. colour LCD with LED backlight 8 colour palettes Mixed thermal and visual images	3.5 in. colour LCD with LED backlight 8 colour palettes Mixed thermal and visual images
Laser pointer	Built-in Class 2 laser	Built-in Class 2 laser	Built-in Class 2 laser
Imager power supply			
Battery	Lithium-ion field rechargeable	Lithium-ion field rechargeable	Lithium-ion field rechargeable
Operation time	Up to 6 hours continuous operation	Up to 5 hours continuous operation	Up to 5 hours continuous operation
AC operation	AC adaptor supplied	USB AC adaptor supplied	USB AC adaptor supplied
Mechanical & environment			
Temperature operating	-5 to +45 °C (23 to 113 °F)	-5 to +50 °C (23 to 122 °F)	-5 to +50 °C (23 to 122 °F)
Humidity	10 to 90% non-condensing	10 to 90% non-condensing	10 to 90% non-condensing
Storage range	-20 to +60 °C (-4 to +140 °F)	-20 to +70 °C (-4 to +158 °F)	-20 to +70 °C (-4 to +158 °F)
Ingress protection level	IP 54	IP 54	IP 54
Dimensions	120 × 90 × 210 mm (4.8 × 3.5 × 8.3 in.)	130 × 95 × 220 mm (5.1 × 3.7 × 8.6 in.)	130 × 95 × 220 mm (5.1 × 3.7 × 8.6 in.)
Mounting	-	Handheld and tripod mounting, 0.25 in. BSW.	Handheld and tripod mounting, 0.25 in. BSW.
Weight	0,70 kg (1.5 lb)	0,80 kg (1.8 lb)	0,80 kg (1.8 lb)
Software	Advanced imager analysis and report writing software suite	Advanced imager analysis and report writing software suite	Advanced imager analysis and report writing software suite
Computer requirements	PC with Windows XP, Vista or Windows 7	PC with Windows XP, Vista or Windows 7	PC with Windows XP, Vista or Windows 7
Kit contents	Thermal camera, removable handle, Micro SD card (2 GB), USB connection cable, Universal AC Adaptor (UK, USA, European and Australian plugs), carrying case, CD containing IFU and software, Quick start guide (English)	Thermal camera TKTI 20, Micro SD card (2GB), USB connection cable, Universal USB AC Adaptor (UK, USA, European and Australian plugs), Carrying case, CD containing IFU and software, Certificate of calibration and conformity, Quick start guide (English)	Thermal camera TKTI 30, Micro SD card (2GB), USB connection cable, Universal USB AC Adaptor (UK, USA, European and Australian plugs), Carrying case, CD containing IFU and software, Certificate of calibration and conformity, Quick start guide (English)



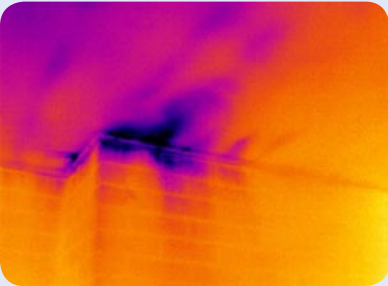
Overheating conveyor bearing



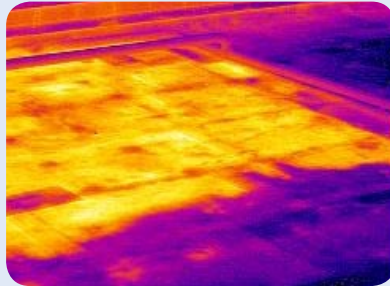
Loss cable connection



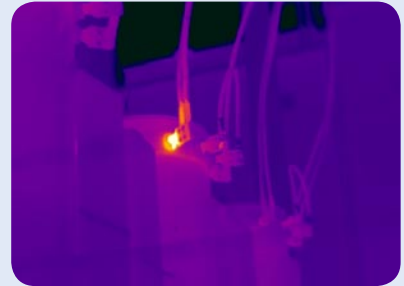
Missing insulation



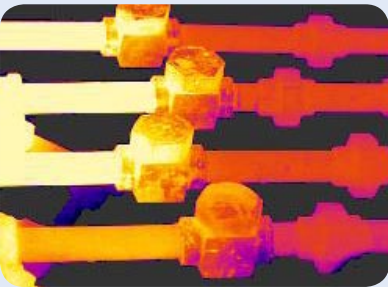
Air infiltration



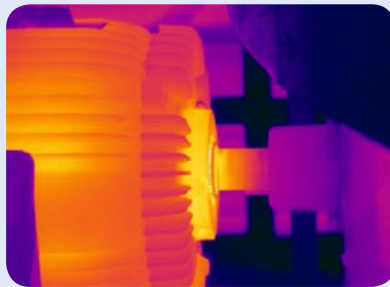
Roof



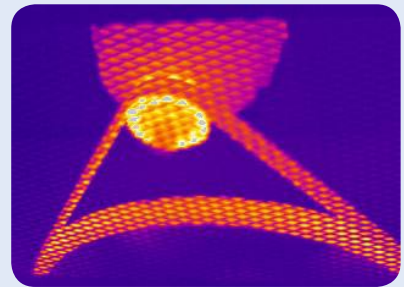
Transformer



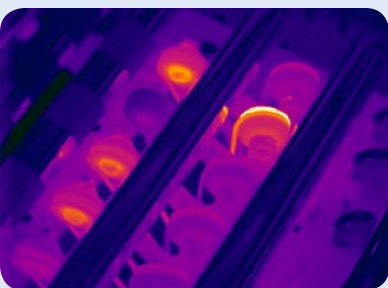
Steam traps



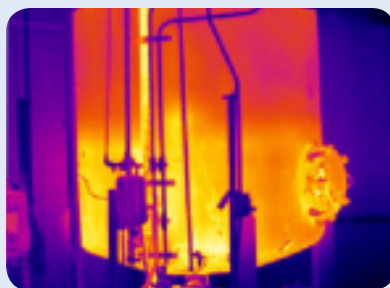
Motor bearing



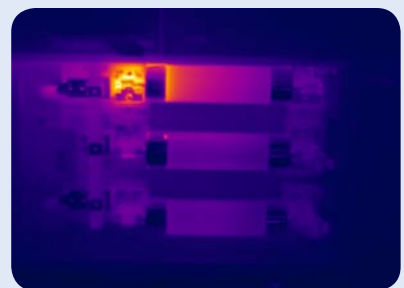
Belt drive



Belt conveyor



Tank



Fused disconnect

Note: pictures are for illustration purposes only

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