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Thermography plays an important role in predictive maintenance as a contactless, imaging temperature measurement method can be used very flexibly. The technology does not interfere with ongoing production operations, nor is maintenance staff exposed to any risks while using it.



# THERMOGRAPHY IN PHOTO QUALITY

**THERMAL IMAGING CAMERAS** localise defective heat exchangers, detect faults in the electronics, overloaded mechanical components or increased energy consumption. The visual representation of the temperature distribution provides a quick overview of the plant condition directly on-site. This can be documented over long periods of time with the aid of thermal images so that maintenance measures can be set at the optimum time. This increases efficiency, productivity and profitability – and ultimately extends the service life of plants, too.

Geometrical resolution plays a crucial role in the maintenance and inspection of plants in the electronics industry. Here, detector resolutions that are too low can quickly cause areas of concern or potential danger points to be overlooked. Sources of error can be ruled out with thermal imaging cameras such as the VarioCAM® HD and VarioCAM® HDx. With the extensive measuring, objects such as photovoltaic systems can be thermographically measured as well as objects requiring safety distances, like high-voltage installations.

## It's the "inner values" that matter...

When compared with conventional detectors, the most powerful models of the VarioCAM® HD have a higher geometrical resolution, resulting in a significant increase in the field of view and about a 40 percent higher range. This is noticeable in practice: As a whole, fewer pan-tilt-movements and single frames are necessary, which shortens and streamlines operating time on site.

Even small temperature differences can be detected with certainty thanks

to a high thermal sensitivity up to 0.02 kelvin. With a frame rate up to 240 Hz, even very rapid thermal processes can be controlled.

The compact, high-quality aluminum housing of the camera is dustproof and splashproof in accordance with protection degree IP54 for harsh industrial use. This protection is also maintained in camera operation with plugged connections, which means that no additional protective housings are usually necessary even in harsh industrial environments. The stationary models even achieve the protection degree IP67. The PC is connected via a GigE Vision compatible interface (TCP/IP). Digital interfaces, such as RS232, Trigger and USB or DVI, are also available.

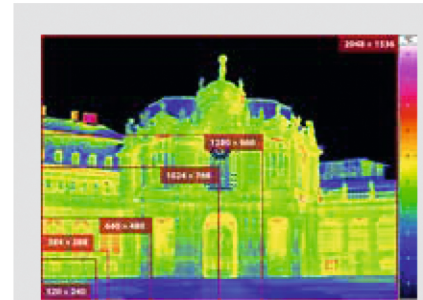
## Switch on and get started...

The handheld camera models are well balanced. Thanks to an individually adjustable hand strap they fit securely in the hand. Their 5.6" extremely bright and luminous colour TFT display with a resolution of (1,280 x 800) pixels can be folded out and rotated in almost any direction on two axes. As a result, images from virtually any position are possible even in situations where little space is available: overhead, across the corner or from a frog's perspective.

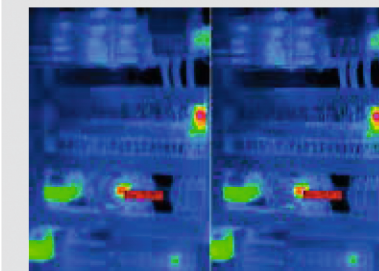
In strong sunlight – such as when inspecting PV systems – a TFT colour viewfinder including a tilt and diopter adjustment is available. The clearly structured camera functions are operated by an easily accessible mini joystick and several, partially programmable buttons. Important manual setting functions can be called up immediately without tedious searching. The automatic or motorized focus responds precisely. An integrated, automatically focussing digital camera with a resolution of 8 megapixels, video function and LED video light for image illumination enable visual digital images rich in detail and contrast. The battery operating time of 3 hours qualify for enduring mobile use.

## Measuring and analysing on site

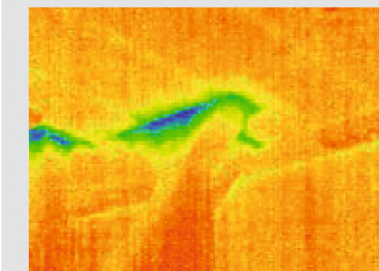
Users can already carry out extensive measurements and analyses with the "camera on-board functions". Thus, they know directly on the spot any potential weak points and areas of concern and can troubleshoot the problem immediately. The measurement and analysis



**A comparison of different detector resolutions clearly demonstrates: Cameras with high detector resolutions see more.**



**Images of a control cabinet with and without an activated MicroScan feature.**



**Representation of the geometrical resolution using the example of a poorly insulated roof beam.**

functions on the camera display include a hot spot/cold spot display, freely movable measurement point markings as well as measurement area markings with minimum, maximum and average value display, whose position and size are also freely adjustable. Alarm marks highlighting all image sections in colour of temperature ranges defined previously, can also be set for quickly displaying measured values that have been exceeded or undercut. A laser marker, which can also be used as a laser rangefinder for object distances of up to 70 m, displays the actual measuring point parallax-free on the object, if required. Particularly valuable for industrial thermography is the thermographic measurement with up to 240 Hz. Even very rapid thermal processes can be controlled and docu-

mented here.

The integrated GPS module provides another vital function for the maintenance. It enables geographic assignment of the measuring locations as well as the automatic location and archiving of the thermal images. This is useful, for example, if a number of measuring objects have to be thermographically measured at different locations at regular intervals.

The EverSharp function ensures that all measuring objects contained in the thermal image are always displayed sharply, regardless of their distance and the depth of focus of the respective camera lens. This also saves valuable work time because only a few images are required compared with conventional thermographic cameras.

## Evaluating thermal images and generating reports

The thermal images can be transmitted via the GigE interface by data cable directly to the PC or read out via the SDHC card. The IRBIS® 3 software included allows to correct, analyse and interpret the thermal images and to generate reports. Thus, for example, even the emissivity of different materials can later be changed for specific image details or individual measuring points. Temperature distributions of an image detail can be displayed based on histograms.

Profile lines simplify the analysis of temperature profiles in the thermal image. Overshooting and undershooting of limit values as well as individual pixels within a specific temperature range can be highlighted for visualising critical temperatures. Time-based evaluations of complete sequences are optional with the IRBIS® 3 plus or IRBIS® 3 professional software. If infrared images are contrasted with the visual digital photographs captured in parallel for the purpose of comparison, or are merged with these, any areas of concern can be better highlighted. Maintenance reports can be generated manually or automatically, whereby report templates speed up the report for short or detailed documentation.

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