

Long-range Thermal Zoom Cameras

More than just range performance ...

The following four images were taken with the high-resolution thermal zoom camera ImageIR® 9300 Z / (1,280 x 1,024) IR pixels from InfraTec. The camera was installed on a radar tower 300 m above sea level on the Adriatic coast.

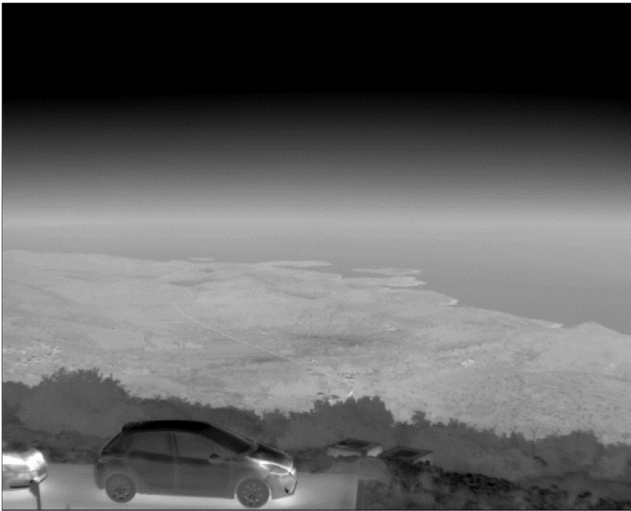


Fig. 1 Wide-angle mode 1x – nearly 40° HFOV



Fig. 2 Image taken with ImageIR® 9300 Z thermal zoom camera using 9x zoom



Fig. 3 Image taken with ImageIR® 9300 Z thermal zoom camera using 17x zoom



Fig. 4 Image taken with ImageIR® 9300 Z thermal zoom camera using 30x zoom – 1.3 x 1.0° FOV

Initial Situation

Using thermal cameras for security applications has become a very common and useful asset for border protection and facility monitoring. The advantages are obvious: Thermal cameras do not depend on light conditions, they provide constant imaging any time a day, can penetrate haze and fog. Even camouflaged persons or vehicles can be detected when entering areas to be considered as off-limits for intruders. Depending on the camera configuration chosen it

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may be possible to detect humans beyond 15 km distance, ground vehicles or small boats beyond 20 km, larger ships or vessels and aircraft beyond 30 km.

But there is more than sheer range performance when you introduce thermal zoom cameras to monitoring tasks:

- The cameras' temperature sensing capabilities also offer the chance to get some tactical information about physical conditions of the remote target – the thermal map or signature indicates the usage of motors. It also allows discriminating passive from active vehicles.
- The bigger the zoom range of the chosen camera, the more options are created for applications at medium up to short distances. If a monitoring outpost is planned to be operated autonomously or remotely this adds self-protection capability as well.
- Zoom flexibility also creates a chance to monitor more than one target at a time, then concentrating on the more interesting intruder.

Requirements Besides a Modern Thermal Camera

Of course a complete monitoring system needs more than a camera:

- High-resolution and sturdy pan-tilt heads are a must for exact pointing and stable images under any weather conditions. Needless to say that stations that shall overlook large areas are exposed to wind, moisture and dust on a higher level than small short-range solutions attached to buildings or protected fixtures. So the pan-tilt needs to be both precise and ruggedized.
- Mating the thermal camera with an equally powerful digital zoom color video camera creates a solution that offers a cost-efficient add-on for additional information like reading of remote letterings.
- A powerful software package can combine complete camera control with a video management system, depending on the user's requirement profile anything should be possible between real-time human-based monitoring up to a fully autonomous operation.
- Adding features like a laser range finder, GPS, mapping software, radar, image stabilization can turn a pure monitoring system into a surveillance workhorse with even more information for the user.

InfraTec's contribution to the above tasks is the development of thermal HD cameras – cooled and uncooled. Their key specifications are:

VarioCAM® HD Z

- Uncooled 1,024 x 768 IR pixel microbolometer detector with a (25 ... 150) mm lens
- Horizontal field of view: (41.5° @ 25 mm ... 6.6° @ 150 mm)

ImageIR® 8300 Z

- Cooled 640 x 512 IR pixel detector with a (28 ... 850) mm lens
- Field of view: (19.8 × 15.9)° ... (0.6 × 0.5)°

ImageIR® 9300 Z

- Cooled 640 x 512 IR pixel detector with a (28 ... 850) mm lens
- Field of view: (39.8 × 32.3)° ... (1.3 × 1.0)°

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Complete solutions from InfraTec are always based on the IROD infrared monitoring software. In addition, InfraTec cameras can be incorporated into the systems of external partners. This extends the possibility to integrate ITAR-free thermal imaging cameras into various static platforms, ground vehicles, aircraft or ships.

Coastal Protection in the Adriatic Sea

Below pictures illustrate the efficiency of an ImageIR® 9300 Z. Located on an Adriatic radar tower it allows near-field imaging for self-protection, mid-range surveillance of the area adjacent to the tower and remote monitoring of ships near to the coast line. The distance range covers some 25 m to beyond 11 km and even the seaspace to a neighbour island more than 40 km away (Fig. 5).



Fig. 5 A view from the Croatian island of Vis to the island of Sušac 43 km away. The rather low building with the small lighthouse on the roof is clearly visible. Same counts for a mast standing a few meters away. As the image shows, on the rest of the island there are neither further buildings nor bigger trees.

Headquarters

InfraTec GmbH
Infrarotsensorik und Messtechnik
Gostritzer Straße 61 – 63
01217 Dresden / GERMANY

Phone +49 351 871-8630
Fax +49 351 871-8627
E-mail thermo@InfraTec.de
www.InfraTec.eu

USA office

InfraTec infrared LLC
5048 Tennyson Pkwy.
Plano TX 75024 / USA

Phone +1 844-226-3722 (toll free)
E-mail thermo@InfraTec-infrared.com
www.InfraTec-infrared.com