



## Using wipers for thermal imaging cameras. A costly and inefficient solution

Today, more and more people are discovering thermal imaging cameras and the benefits they have to offer. Thermal imaging cameras are being used for security and surveillance applications, to help drivers and captains navigate in the darkest of nights, help firefighters locate people in burning buildings and many other useful and sometimes even life-saving applications. Thermal imaging cameras produce a clear image in the darkest of nights, in light fog and smoke and in the most diverse weather conditions.

Exactly because they can also be used in light rain, fog, snow, smoke and other extreme environments, the questions often rises: "Is water or dust on the lens obstructing the vision of the thermal imaging camera? Is it necessary to install wipers before the lens of the thermal imaging camera so that water and dust can be removed?"

Wipers are used occasionally e.g. in CCTV camera installations, where the optical materials are made of glass. The wiper is used to remove dirt, salt and water from the lens. The optical materials used for the lens, in the case of a CCTV camera glass, needs to be resistant against scratches caused by the movement of the wiper. Sand or other small particles can come between the lens and the wiper which causes scratches on the lens when the wiper is working. In order to reduce the risk of scratches at the lens, a tank of cleaning fluid, in most cases water, is very often installed along with the camera.

Since a thermal camera looks a lot like a normal CCTV camera, many customers ask the question if a thermal camera needs to be equipped with wipers as well. Many companies offer a variety of systems to

claim extreme weather readiness, including wipers. FLIR Systems has found that wipers are a neat item to look at but in the real world they offer little if no usable benefit when installed on a thermal imaging camera.

### Multiple reasons for not installing wipers

First of all, it is not needed to remove the dirt, salt and water droplets on the lens of a thermal imaging camera. These particles are extremely close to the camera and are therefore completely out of focus. This means that you will not even see them on the thermal image. Furthermore, the particles are so small that they are not obstructing the infrared radiation that goes through the lens and that is captured by the infrared detector, to create a crisp thermal image.



The lens of the FLIR Systems HRC can be covered with a lens cap in extreme conditions or when not being used. The camera contains built-in heaters which prevent condensation.

In the exceptional occasions where the lens is so much contaminated with dirt that it is interfering with the quality of the thermal image, FLIR Systems recommends that the lens is cleaned manually, without using a wiper. All FLIR Systems thermal imaging cameras are well sealed. Their vital core is well protected against humidity, dust and water. A sealed lens maintains the, often military, specifications of the existing enclosure. This means that, if necessary, the lens can be cleaned from a distance, with a hose, just like other material and equipment.

But there is more. Although an infrared camera looks a lot like a normal video camera it is far from the same thing. Glass, which is used for producing the lenses of a CCTV camera, does not transmit infrared radiation well. And so the lenses of a thermal imaging



camera are made of germanium. This metal is a good transmitter of infrared radiation. It is however a very expensive metal so the lens needs to be protected as much as possible against scratches. If the germanium lens becomes scratched and pitched, e.g. by the small particles between a wiper and the lens, there is a steady decline in the thermal image quality. In situations where the smallest of details need to be detected, this is unacceptable.

Most FLIR Systems infrared cameras have hard carbon coating. Although this coating is putting a protective layer over the lens and protecting it against scratches and pits in practically all weather conditions, it can be scratched and damaged by the use of a wiper.

Another reason for installing wipers might be that the cameras are often performing in humid conditions and that condensation can occur on the lens. FLIR Systems thermal imaging cameras that need to perform in these conditions are practically always equipped with built-in heaters that are preventing condensation on the lens. So again, there is no need to install wipers.

**Wipers: increasing cost and downtime**

When using a thermal imaging camera, installing wipers is definitely not the best option. Not only because they are likely to damage the expensive germanium lens of the camera, but installing wipers is also a costly item in terms of initial system design and maintenance.

Many of FLIR Systems' Thermal imaging cameras use the front lens element as the seal against the environment and not an extra, flat IR window. This means that a potential wiper must follow the lens curvature to clean it properly.

Customers that absolutely want to install a wiper, do not only have to face the price of the initial installation. Definitely in security and surveillance applications, thermal imaging cameras are often installed in a high position so that they can overlook an entire area. In a fixed pole or building mount scenario this requires man power to climb the pole and either replace the wiper at the top of the pole or un-mount the entire camera assembly and bring it to the ground for repair. In both cases this means

an additional maintenance schedule. Not only will this increase the exploitation cost, but even more important, the camera will be out of use for a period of time which is often unacceptable.

A wiper system for a thermal imaging camera must also include a water spray (or similar) in order to try avoiding lens damages. This is rather tricky with a slip ring based, continuous rotating Pan/Tilt Head (PTH). The cleaning fluid needs a reservoir installed on top of the Pan/Tilt (along with the cameras) and requires additional, regularly refill service.

Experience has learned that if wipers and a water spray installation are installed there is always the risk of operators playing with it. This leads to additional refill services and maintenance which is again increasing the operational cost of the thermal imaging system. And if the lens is really dirty, spraying water on it and cleaning it from a distance with a wiper, will create a layer of mud which will obstruct the imaging capabilities of the camera.

**Better options to protect the lens of a thermal imaging camera in extreme conditions.**

All the above arguments quickly lead to the conclusion that installing wipers on a thermal imaging camera is not a good, and definitely not a cost effective, solution.

It has to be admitted however that there are extreme conditions in which even a thermal imaging camera can not produce a clear image and where its germanium lens needs to be protected against the environment in order to protect it against damage.

FLIR Systems has installed many thermal imaging cameras in extreme climate conditions. Numerous FLIR Systems cameras are being used today in the desert, in arctic climates, along coastal borders, ...

So how are the lenses protected against scratches in sand storms and other extreme conditions? FLIR Thermal imagers that are installed in these conditions are equipped with a so called "parking position". This means that if they are not being used, for whatever kind of reason, they can be remotely turned and positioned into a pose that they are protected against the environment. Another possibility is that a

lens cap can be remotely positioned before the lens to protect it.

In both cases, the expensive germanium lens is well protected against scratched and other possible damage. There is no risk at all, that by using a wiper, which is probably not effective at all, the lens is getting damaged.

And FLIR Systems thermal imaging cameras that do have a dirty lens can be quickly, from a distance, cleaned with a hose, a fast and cost effective solution, so that they are again producing the crisp, clear, detailed thermal images for which FLIR Systems is renowned in the market.



*The protective lens cap of the HRC can remotely be positioned before the lens to protect it.*



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