

FLUKE®



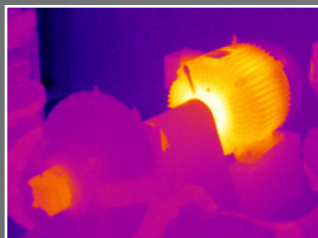
240 px

320 px

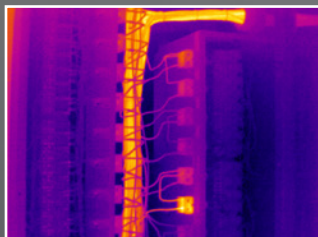
What professionals look for in an infrared camera

Infrared thermography gives troubleshooting and maintenance technicians the tools they need to detect subtle problems before they result in failures. That's because heat—or the lack of it—is a very good indicator of all kinds of mechanical, electrical, electronic and building envelope trouble.

Today, there are more models of infrared cameras than ever before available with a wide variety of capabilities and prices. So how do you decide which infrared camera you need? The precise answer varies with your specific applications. However, there are some basic capabilities professional thermographers and in-house troubleshooters or maintenance technicians look for.



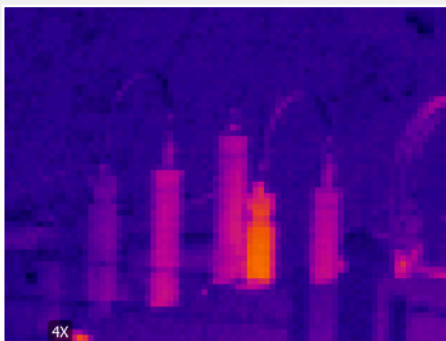
TiS75—motor



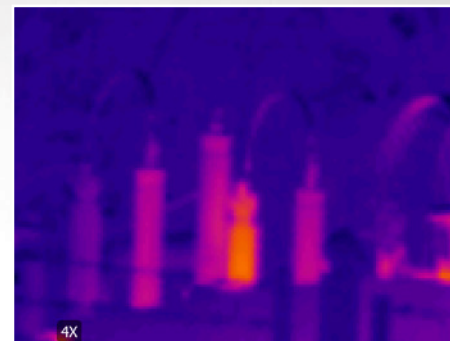
Ti400—lighting control circuits



TiX560—utilities



TiX560—4x zoomed at regular resolution.



TiX560—4x zoomed using SuperResolution.

1 Good quality images

Image quality is critical to getting better diagnostic information. To find an infrared camera, also called thermal imager, that delivers the resolution you need, consider these factors:

Detector resolution, measured in pixels, indicates the number of detector pixels focused on the target. Each pixel detects the apparent temperature measurement of an area of the target. Generally, the higher the number of pixels, the more detailed image your camera will provide. In practical terms, higher resolution will help you detect small wires in electrical cabinets, pick up more detail in small targets, and allow you to work a safer distance away from hazardous situations.

A 320 x 240 detector resolution is generally accepted as the minimum standard among professional thermographers for industrial applications. This number of pixels provides a level of detail that allows you to identify subtle issues, and provides the image quality to clearly communicate problems to managers and clients. Some more specialized applications such as power generation and transmission, oil and gas processing, research and development, and quality control can benefit from cameras with even higher resolution such as 640 x 480 or 1024 x 768. Fluke offers several thermal imager models in the 320 x 240 resolution range as well as lower resolutions and higher resolutions up to 1024 x 768. Certain 320 x 240 models, including the TiX560, offer SuperResolution, which captures 4x the data and combines the data to effectively create a 640 x 480 image.



Resolution: 320 x 240
FOV: 35.7° x 26.8°
D:S: 504:1

Details in this image are a bit harder to see due to the wider field of view that leads to a lower distance to spot (D:S).



Resolution: 320 x 240
FOV: 24° x 17°
D:S: 753:1

Same resolution, but the tighter field of view enables you to see more details in the target from the same distance.

Both images were taken with Fluke cameras at 1.5 m (5 ft) from the target.

Field of view (FOV) on an infrared camera is nearly as important as the detector resolution in determining image quality. FOV defines the area the imager sees at a given moment. A camera with a wider FOV displays a larger area (see images on the left). If you are inspecting a target from a distance due to obstructions or safety concerns, a camera with a wider field of view typically displays a much broader area than you need to examine. Each pixel detects the apparent temperature measurement of a larger area, so the image isn't as detailed.

If you compare two cameras from the same distance with the same detector resolution, but one camera has a tighter field of view, the image from the latter camera will be more detailed because the pixels are focused on a smaller area. That field can be further tightened if your camera is compatible with telephoto lenses, allowing you to see much greater detail from the same distance.

Professional thermographers and maintenance professionals often need to identify small anomalies in electrical or mechanical equipment, compare measurements to baselines, or create life curves for equipment to maintain uptime within their facility. Those applications call for the greater detail that a tighter field of view offers.

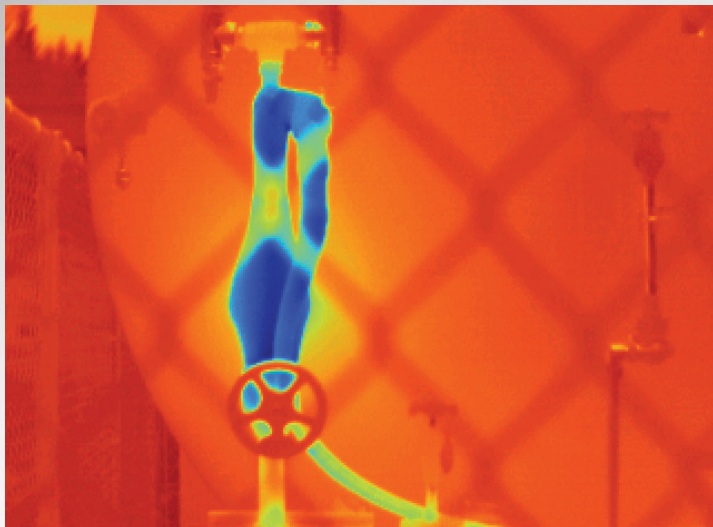
However, a wide field of view is better for certain applications, such as building diagnostics where thermographers may need to view a large building

or roof from a relatively close distance, and any thermal anomalies are likely to be relatively big. Other applications where a wide field of view is desirable are scanning a lot of components in tight quarters and looking through an IR Window where the wide field of view lets you see more of the area through the small window. Some Fluke infrared cameras with a narrow field of view are compatible with wide angle lenses, so you can get the wide field of view when needed and a tighter field of view to see more detail the rest of the time.

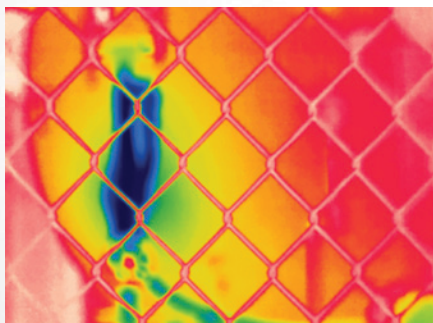
See the Fluke field of view calculator at [fluke.com/fov](https://www.fluke.com/fov) to determine the camera and lens combination that will give you the detail you need for your application.

Spatial resolution, measured in mRads, takes into account both detector resolution pixels and field of view. The best spatial resolution includes the largest number of detector pixels within the smallest field of view. Look for a smaller mRad number for a more detailed image. A spatial resolution of 2.0 mRad or less is a good choice to be able to see details like hot wires or screws in an electrical panel or small air leaks in electrical housing fixtures or around windows.

Thermal sensitivity, measured in millikelvins (mK), can also affect image quality. If you are looking at very small changes in temperature, better thermal sensitivity will help you see that difference. Thermal sensitivity in Fluke cameras ranges from 150 mK to 30 mK—the lower the number, the better.



Fluke LaserSharp™ Auto Focus captures what you need. Every. Single. Time.



Passive auto focus systems may only capture near-field subject



Difficult inspection sites

2

Ease of focus

In infrared thermography focus means more than just getting a pretty image. An out-of-focus infrared image can produce a temperature measurement that is off by 20 degrees or more. A blurry infrared image can prevent you from identifying critical anomalies in the components under inspection. The faster and more precisely you can focus the better your results.

Many experienced thermographers prefer a manual-focus infrared camera to ensure that each image is precisely focused. However, manual focusing takes a significant amount of time, and not all manual focus systems are created equal. Check for a focus wheel that is engineered for precise adjustments.

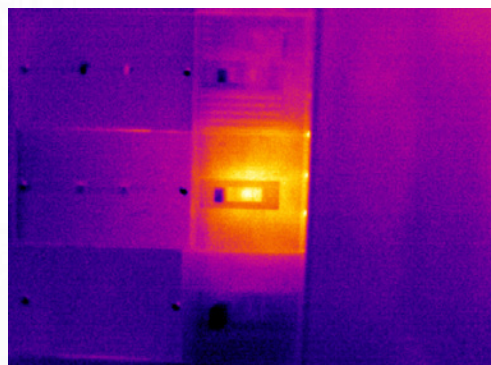
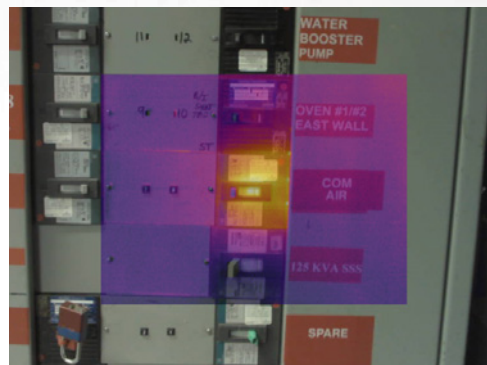
Autofocus speeds up the process, but in some cameras doesn't allow choosing which target in the field of view to focus on, so manual adjustment is often still necessary.

Laser-assisted auto focus provides both precision and speed. It uses a laser to select the target so you get a highly accurate in-focus image of your intended target. Fluke offers LaserSharp® Autofocus in certain models, which includes an onboard laser distance meter that accurately calculates and displays the distance to the target. The camera then automatically focuses on the target based on that calculation to capture a precisely focused image.



50 % mode

PIP mode



Full IR

3

Infrared/visible light image blending

Once you've identified a problem in an infrared image, you still need to find that same spot on the physical equipment or area that you've scanned. That's why some infrared cameras include a digital camera that captures a visible light image of the same target. The camera blends the infrared image with the visible light image to help you precisely locate the point of interest.

In looking at the visible light camera you need to make sure that it offers a high enough resolution to provide a clear visible light image on the camera and professional quality images for reports. A minimum of 5MP for a visible light camera is a good rule of thumb.

When comparing cameras, look at how the infrared and visible light images are blended and whether you can adjust the degree of blend to more easily identify problem areas. IR-Fusion® technology, patented by Fluke, automatically captures a digital visible light image at the same time as an infrared image. The camera blends the two images in a single display. You can view the image in full infrared, full visible light or at several degrees of blending in between to precisely identify the point of interest.



4 Multi-tool measurement comparison

Whether troubleshooting or conducting preventive maintenance inspections, getting more information faster is a big benefit. So the ability to see other parameters such as electrical and vibration measurements along with the infrared image can help you pinpoint problems faster. Many Fluke infrared cameras include Fluke Connect® wireless capabilities that allow you to transmit infrared images to the cloud from a smartphone app where they can be shared and viewed along with Fluke Connect wireless enabled current, voltage, and vibration measurements. This gives you a more complete picture of your equipment and can save time in diagnosing problems. Some models also pull in measurements from other Fluke Connect enabled tools, right on your camera screen, to help you get the full picture of what's happening.

5 Real time collaboration



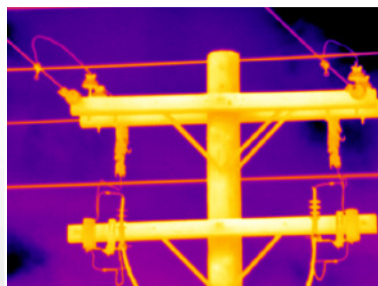
Some infrared cameras can send images and data via smartphone to the cloud so that colleagues and clients anywhere can be engaged to help resolve issues—without the thermographer having to leave the point of inspection. Fluke infrared cameras offer this capability through Fluke Connect ShareLive™ video calls. You can share live images and data simultaneously with multiple people located in multiple locations to get feedback and immediate approval to resolve critical problems on the spot.



6 Versatile performance

Infrared inspection can take you into all kinds of environments to work on all kinds of applications, so your thermal imager needs to be versatile. For the most versatility consider a camera compatible with multiple lens options—telephoto, wide angle, and macro—to multiply the applications you can handle with the same camera.*

If you need to capture images around tough angles or take a lot of images above your head, the ability of the camera to articulate can be critical. This allows you to see images at a more comfortable angle on the screen, despite the actual position of the target. Some Fluke infrared cameras offer up to 180° articulation.



4x telephoto lens



2x telephoto lens



Standard lens

* Lenses are not available with all Fluke models. See [Fluke.com/IRlens](https://www.fluke.com/IRlens) for camera and lens compatibility.



7 Onboard analysis features

With good analysis tools on the camera and a large enough display, you can diagnose and resolve many problems right in the field. The larger the screen, the more detail you can see on the camera, and the more likely you can correctly diagnose the actual issue. Fluke thermal imagers feature a minimum display screen of 3.5 inches. The displays on the Fluke TiX5xx Expert Series cameras are a full 5.7 inches, and they allow you to optimize images you've already taken, right on the screen. You can adjust the level and span, IR-Fusion® blending, and details like emissivity, or add a center box or markers to see temperature measurement readings at various points in the image.

Fluke infrared cameras also include SmartView® software for your PC that allows you to adjust the image and use markers and color alarms to highlight and quantify the severity of problems and easily create customizable reports. You can also email infrared images to your client or manager from your smartphone with Fluke Connect® before you leave the inspection site.



Fluke TiS75



Fluke Ti400



Fluke TiX560

Three popular 320 x 240 cameras from Fluke

	Fluke TiS75, Performance Series	Fluke Ti400, Professional Series	Fluke TiX560, Expert Series
Detector resolution	320 x 240	320 x 240	320 x 240 / SuperResolution mode: 640 x 480
Field of view	35.7° x 26.8°	24° x 17°	24° x 17°
Spatial resolution	2.0 mRad	1.3 mRad	1.3 mRad
Thermal sensitivity	80 mK	50 mK	30 mK
Temperature measurement range	-20 °C to +550 °C (-4 °F to +1022 °F)	-20 °C to +1200 °C (-4 °F to +2192 °F)	-20 °C to +1200 °C (-4 °F to +2192 °F)
Focus system	Manual focus, engineered for precise adjustments	LaserSharp® Auto Focus with built-in laser distance meter and advanced manual focus	LaserSharp® Auto Focus with built-in laser distance meter and advanced manual focus
IR-Fusion® blending technology	Yes, 5 MP visible light camera	Yes, 5 MP visible light camera	Yes, 5 MP visible light camera
See and share images with Fluke Connect® app	Yes	Yes	Yes
See measurements from other Fluke Connect® enabled tools on your camera screen	Yes	Yes	Yes
Optional lenses		2x and 4x telephoto, wide angle	2x and 4x telephoto, wide angle, 25 micron macro
Articulating lens			180° articulation
Optimize saved images on the camera screen			Yes
Software	SmartView® software and Fluke Connect®	SmartView® software and Fluke Connect®	SmartView® software and Fluke Connect®

To find out which camera is best for your application, call 888.413.5433, and one of our thermography experts can answer your questions or schedule a product demo.

Fluke.com/infraredcameras

