Flir CX thermal imaging camera

General information

1/. The CX thermal imaging camera is suitable for looking for poorly insulated areas in a house, or locating the source of drafts, factors that may be quite simply remedied. For sophisticated analysis of how well a building is insulated, a camera with higher definition and a trained operator are needed.

2/. When assessing insulation of houses, it is necessary to have a temperature gradient between the inside of the house and outside. This should be a minimum of 5 degrees C (10 degrees F), and have been present for at least 1 hour. The greater the temperature difference the easier it is to carry out a survey.

3/. The imaging camera records different temperatures using a colour scale. Higher temperatures are lighter colours (red and yellow - white is potentially off the top of the scale), and cold temperatures as darker colours (purple and blue – Black is potentially off the bottom of the scale).

4/. The camera is set by default to change the temperature range automatically, and for seeking out areas of poor insulation in houses this may be all that is needed. If you want to compare the temperature of different areas accurately it is possible to set the temperature scale manually (see below, or the user's manual at back of file).

Be aware that in the automatic range the scale will change maximum and minimum temperatures, as well as the range of temperature covered (ie it may be reading over 5 degrees or 25 degrees). This means the same temperature may be represented by different colours in different images – To measure a temperature exactly, check the spot meter temperature measurement (see "image screen" figure 1 below), and do not rely on colours to compare different rooms or areas.

Setting the range manually

Usually, a range of about 5 to 25 degrees centigrade will give an adequate range for inside measurements

1. On the bottom right of the screen, tap the three dots icon.
2. Tap "temperature scale".
3. Tap the hand icon, then "manual".
4. Tap the figure showing the maximum temperature being measured. The top of the range will now be fixed whilst you alter the bottom. - Touch the area to the left of range indicator, and slide up or down until the temperature you require is shown at the bottom of the scale. Tap bottom temp figure, and this will be fixed.
5. Tap the top figure again which will allow it to be adjusted. Repeat sliding the scale on the left until upper figure shows required temp. Tap the top figure to fix it, and the screen should revert to imaging mode. If not touch "manual"

Getting started

1/. Turning on the camera: -

Hold the camera with the lanyard at the bottom right side, with the 2 lenses pointing away from you, and the screen towards you (see figure 1). The On/Off button is on the top edge of the camera, being the smaller of the two buttons. Press and hold this for at least two seconds. If the camera has been used recently, then the screen will light up within 5-10 seconds. If it has been unused for some time, then it may take up to a minute before the screen is lit and the camera ready for use.

2/. Turning off the camera: -
Press and hold the On/Off button for one second.

3/. Charging the camera: -
A USB C connector port is present at the left-hand side of the camera (see figure 1). If needed the camera can be charged using the USB lead provided. When the charge is low a battery shaped icon coloured red will appear on the screen This is white when between 20% and 100% charged, and changes to green when charging,

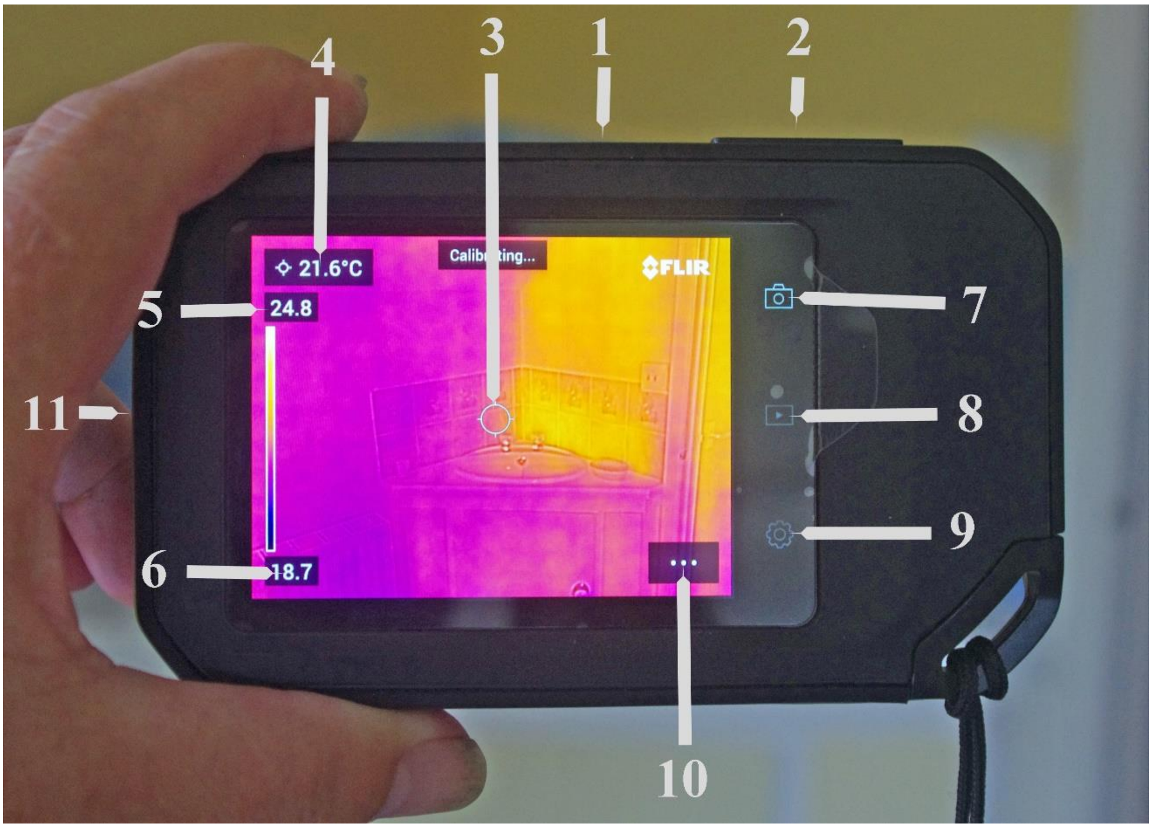

Figure 1. view of the camera from the back.

1. On/Off button
2. Save image button
3. Spot meter (circle).
4. Temperature in spot meter area
5. Maximum temperature being measured.
6. Minimum temperature being measured
7.Touch screen icon – Live view (ready to measure temperatures)
8.Touch screen icon - Gallery button (view stored images).
9. settings button – see user’s manual if you want to change settings.
10. menu button – see user’s manual.
11. USB C Connector

Making assessments

Turn on the camera, and allow it to settle for a few moments. It can then be pointed at any area of interest, and a thermal image will be seen on the screen. The camera also overlays a normal photographic image on the screen, so that it is easier to assess what structures you are looking at.

1/. Images made from outside the house. Assuming there is an adequate temperature gradient (>5degrees C), and the house is hotter inside than the outside temperature, then you need to look for areas of lighter colouring to see where heat is being lost (see figure 2).

2/. Images made from inside the house. Assuming there is an adequate temperature gradient (>5degrees C), and the house is hotter inside than the outside temperature, then you need to look for areas of darker colouring to see where heat is being lost (see figure 3).

Some factors that can affect images

1/. Wind – When imaging from outside, be aware that wind will cool the surfaces you are imaging. Some areas may be protected from the wind, and show correct temperatures, whilst unprotected areas may appear colder than they actually are.

2/. Sunlight – Sun shining on an area inside or outside the building will warm the surface you are measuring, and can give significantly raised temperatures. These may be present for some time after the sun has gone off the area (1/2 to 1 hours, depending on the material affected).

3/. Moisture – Water acts as a “heat sink” for the infra-red radiation the camera is measuring. The camera will normally measure the heat of the water surface, rather than the underlying surface. This means water will normally show as a cold area. Damp areas will also appear colder than surrounding dry areas.

4/. The camera measures infrared radiation. This is usually given off at right angles to the surface of any structure. If the camera is not pointed perpendicular to the surface, then a lower temperature may be read than the real surface temperature.

5/. Glass – The camera will measure the surface temperature of glass, not the structures that you can see through it. Be aware that the photographic image overlaid on the camera screen will show objects that are visible through the glass, but the temperature is the glass surface.

Double glassing is often treated so that it allows radiated heat to pass into the house, but reflects it back from the inside, to trap heat in the house.

6/. Reflected heat – Radiation can be reflected from surfaces, and can cause confusion. Normally surfaces reflecting infrared radiation will be hard and dry. They may be any colour, and mat or shiny.

7/. The type of material, and colour will affect heat loss measurements. Normally Black surfaces will gain and loose heat quicker than white, and dull surfaces will also gain and loose heat quicker than shiny surfaces.

One final comment. During normal everyday activities we breath out water vapour. Also cooking, baths, showers and many other activities will lose water vapour into the atmosphere. This may condense on cool surfaces, and so may cause a source of damp and encourage fungal growth. As you eliminate drafts, do remember to let some fresh air into the building to counter effects of high humidity. You can of course also run a dehumidifier if you manage to eliminate too many drafts.

Example images

Outside views

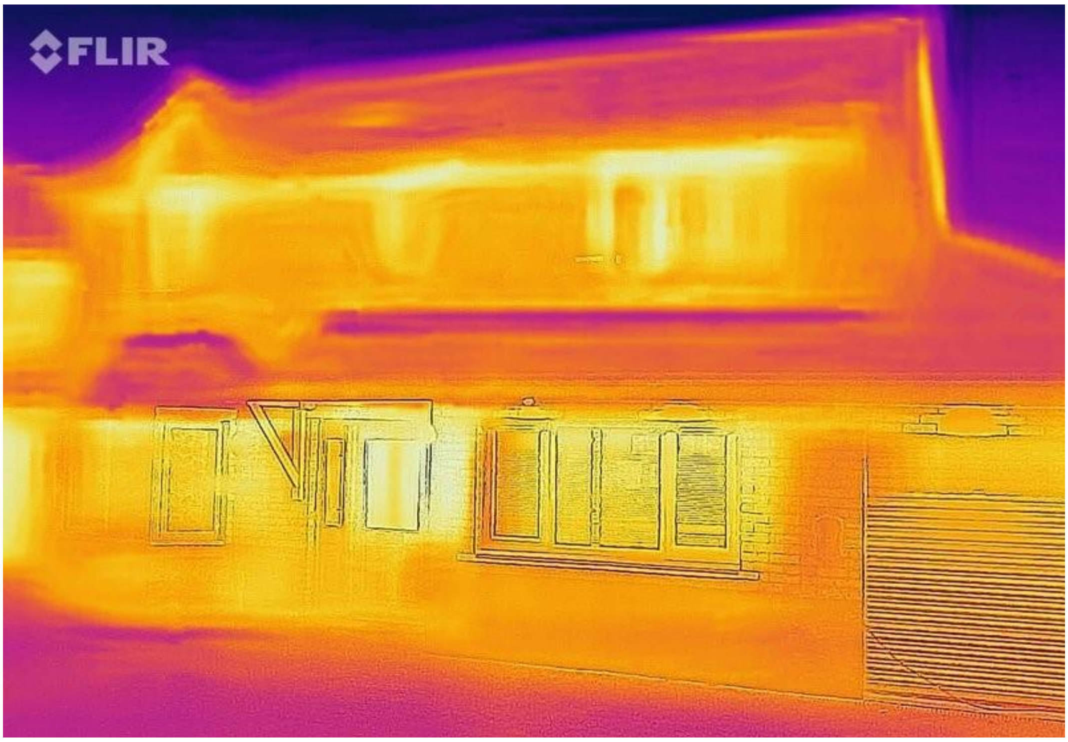

Figure 2

Imaging from outside, the brighter yellow and white areas show where maximum heat loss is occurring. This house has no cavity wall insulation. Excessive heat is also being lost around the front door and the windows, and there is a “hot spot” in the roof above the centre window which is probably resulting from a poorly insulated loft trap door.

Inside views

Inside views show areas where heat is being lost as darker colours (purple or black).

Figure 3a shows heat loss around a door. Figure 3b shows the same door with a “draft excluder” (a role of fabric) placed across the bottom of the door. A better result could be expected using a commercially available draft excluder strip around the door frame, cutting down heat loss all around the door.

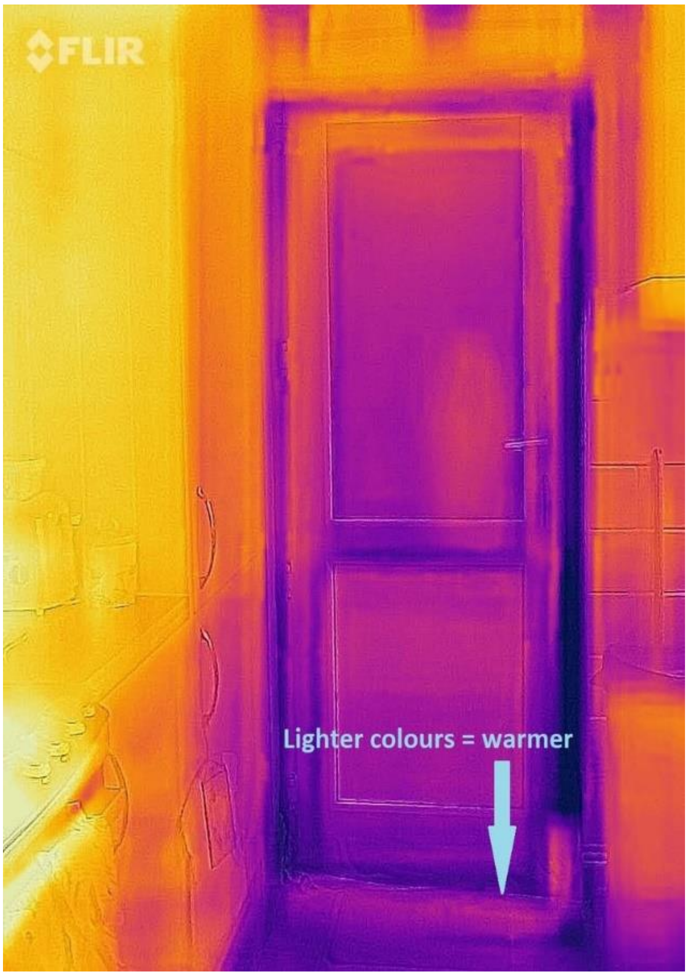

Figure 3A

Figure 3B

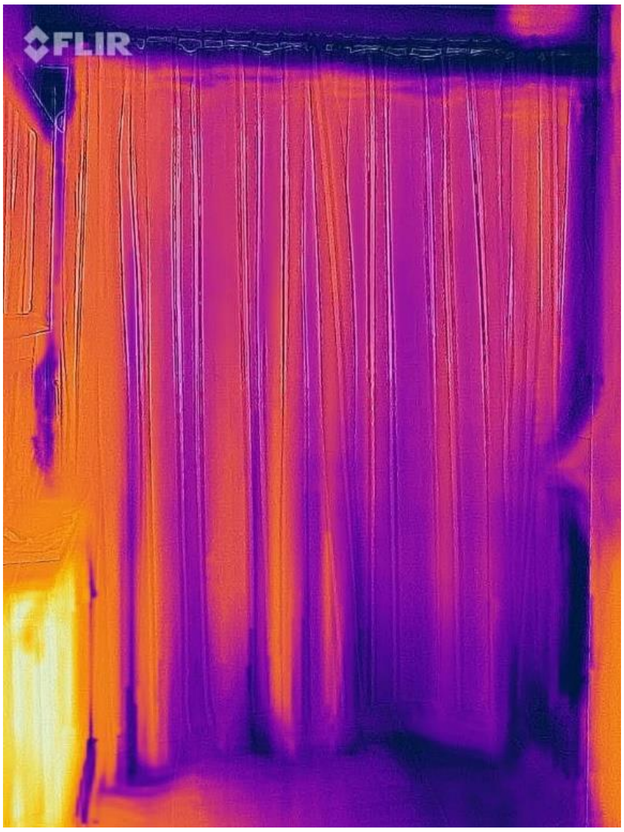

Figure 4a Figure 4b

Fig 4a shows heat loss from a front outside door. Note that there is heat loss around the frame (bottom and left side), from the glassed window and from the letter box and lower door panels. Whilst replacement of the door would be the most efficient option, attention to the letter box and the heat loss around the door frame could be a cheaper option. The use of a curtain as figure 4b would also be beneficial. The hot (white/yellow) area to the left of the door is a radiator.

Figure 4c

This figure shows a modern double glassed door with good insulation of both the glazing and the lower panels of the door. There is however still some cold seepage around the lower part of the door where it fits a little loosely in the frame.

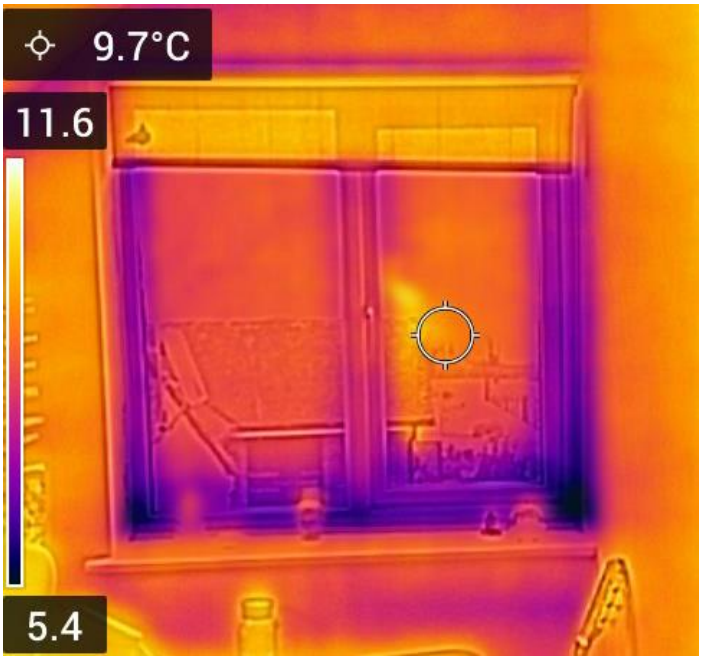

Figure 5a
A recently installed double glassed window showing good insulation of the glassing, although there is some cold air along the bottom of the window. There is a partial reflection of heat emitted by the camera operator

Figure 5b
A double glassed unit installed about 15 years ago, but with the same aspect as 5a. and adjacent to it. Notice the temperature range settings on the camera are the same, but the window surface is 3 degrees colder than that of the modern unit.

There is a clearly visible reflection of heat emitted by the camera operator on this image.

Figure 6

This shows the floor of an upstairs passage. The hot area is where the pipes run from the boiler to the hot water tank, under the floor boards. Whilst this is heating for the passage in winter, it represents unnecessary heat lost from the hot water system during summer time.