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User's manual FLIR Ex Pro series



Important note

Before operating the device, you must read, understand, and follow all instructions, warnings, cautions, and legal disclaimers.

Důležitá poznámka

Před použitím zařízení si přečtěte veškeré pokyny, upozornění, varování a vyvázání se ze záruky, ujistěte se, že jim rozumíte, a řiďte se jimi.

Viktig meddelelse

Før du betjener enheden, skal du læse, forstå og følge alle anvisninger, advarsler, sikkerhedsforanstaltninger og ansvarsfraskrivelser.

Wichtiger Hinweis

Bevor Sie das Gerät in Betrieb nehmen, lesen, verstehen und befolgen Sie unbedingt alle Anweisungen, Warnungen, Vorsichtshinweise und Haftungsausschlüsse

Σημαντική σημείωση

Πριν από τη λειτουργία της συσκευής, πρέπει να διαβάσετε, να κατανοήσετε και να ακολουθήσετε όλες τις οδηγίες, προειδοποιήσεις, προφυλάξεις και νομικές αποποιήσεις.

Nota importante

Antes de usar el dispositivo, debe leer, comprender y seguir toda la información sobre instrucciones, advertencias, precauciones y renunciaciones de responsabilidad.

Tärkeä huomautus

Ennen laitteen käyttämistä on luettava ja ymmärrettävä kaikki ohjeet, vakavat varoitukset, varoitukset ja lakitiedotteet sekä noudatettava niitä.

Remarque importante

Avant d'utiliser l'appareil, vous devez lire, comprendre et suivre l'ensemble des instructions, avertissements, mises en garde et clauses légales de non-responsabilité.

Fontos megjegyzés

Az eszköz használatá elött figyelmesen olvassa el és tartsa be az összes utasítást, figyelmeztetést, óvintézkedést és jogi nyilatkozatot.

Nota importante

Prima di utilizzare il dispositivo, è importante leggere, capire e seguire tutte le istruzioni, avvertenze, precauzioni ed esclusioni di responsabilità legali.

重要な注意

デバイスをご使用になる前に、あらゆる指示、警告、注意事項、および免責条項をお読み頂き、その内容を理解して従ってください。

중요한 참고 사항

장치를 작동하기 전에 반드시 다음의 사용 설명서와 경고, 주의사항, 법적 책임제한을 읽고 이해하며 따라야 합니다.

Viktig

Før du bruker enheten, må du lese, forstå og følge instruksjoner, advarsler og informasjon om ansvarsfraskrivelse.

Belangrijke opmerking

Zorg ervoor dat u, voordat u het apparaat gaat gebruiken, alle instructies, waarschuwingen en juridische informatie hebt doorgelezen en begrepen, en dat u deze opvolgt en in acht neemt.

Ważna uwaga

Przed rozpoczęciem korzystania z urządzenia należy koniecznie zapoznać się z wszystkimi instrukcjami, ostrzeżeniami, przestrożami i uwagami prawnymi. Należy zawsze postępować zgodnie z zaleceniami tam zawartymi.

Nota importante

Antes de utilizar o dispositivo, deverá proceder à leitura e compreensão de todos os avisos, precauções, instruções e isenções de responsabilidade legal e assegurar-se do seu cumprimento.

Важное примечание

До того, как пользоваться устройством, вам необходимо прочитать и понять все предупреждения, предостережения и юридические ограничения ответственности и следовать им.

Viktig information

Innan du använder enheten måste du läsa, förstå och följa alla anvisningar, varningar, försiktighetsåtgärder och ansvarsfriskrivningar.

Önemli not

Cihazı çalıştırmadan önce tüm talimatları, uyarıları, ikazları ve yasal açıklamaları okumalı, anlamalı ve bunlara uymalısınız.

重要注意事項

在操作设备之前，您必须阅读、理解并遵循所有说明、警告、注意事项和法律免责声明。

重要注意事項

操作裝置之前，您務必閱讀、了解並遵循所有說明、警告、注意事項與法律免責聲明。

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Safety information





1.1 Radio

	WARNING
Applicability: Class B digital devices.	
<p>This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:</p> <ul style="list-style-type: none"> • Reorient or relocate the receiving antenna. • Increase the separation between the equipment and receiver. • Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. • Consult the dealer or an experienced radio/TV technician for help. 	
	WARNING
Applicability: Digital devices subject to 15.19/RSS-GEN.	
<p>NOTICE: This device complies with Part 15 of the FCC Rules and with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:</p> <ol style="list-style-type: none"> 1. this device may not cause harmful interference, and 2. this device must accept any interference received, including interference that may cause undesired operation. 	
	WARNING
Applicability: Digital devices subject to 15.21.	
<p>NOTICE: Changes or modifications made to this equipment not expressly approved by FLIR Systems may void the FCC authorization to operate this equipment.</p>	
	WARNING
Applicability: Digital devices subject to 2.1091/2.1093/KDB 447498/RSS-102.	
<p>Radiofrequency radiation exposure Information: The radiated output power of the device is far below the FCC radio frequency exposure limits. Nevertheless, the device should be used in such a manner that the potential for human contact during normal operation is minimized.</p>	
	WARNING
<p>This device is granted pursuant to the Japanese Radio Law (電波法) and the Japanese Telecommunications Business Law (電気通信事業法). This device should not be modified (otherwise the granted designation number will become invalid)</p>	
	CAUTION
<p>The 5 GHz band is only allowed for indoor use in Japan and Canada.</p>	



Note FLIR Systems AB declares that the radio equipment type FLIR Ex Pro series is in compliance with Directive 2014/53/EU.

Note Radio operates in standard 802.11 b/g/n in frequency range 2400-2480 MHz and 5150 – 5250 MHz with max output power 15 dBm.

1.2 Battery and charging

	WARNING
<p>If you do not obey these Warnings, an explosion or an ignition can occur. This can cause injury to persons and damage to the equipment.</p> <ul style="list-style-type: none"> • Do not disassemble or do a modification to the battery. • Do not continue to charge the battery if it does not become charged in the specified charging time. • Do not use the battery if there is an unusual smell from the battery, if the battery feels hot, changes color, changes shape, or is in an unusual condition. 	
	WARNING
<p>If there is a leak from the battery and you get the fluid in your eyes, do not rub your eyes. Flush well with water and immediately get medical care. The battery fluid can cause injury to your eyes.</p>	
	CAUTION
<p>If you do not obey these Cautions, damage to the equipment can occur.</p> <ul style="list-style-type: none"> • Only use the battery, battery charger, and power supply that FLIR Systems supplies. • Do not get water on the battery, or permit the battery to become wet. • Remove any water or moisture on the battery before you install it. • Do not hit or cause shocks to the battery. • Do not connect the positive and negative terminals of the battery to each other with a metal object (such as wire). • Do not put the battery near high-temperature locations or into direct sunlight. • Only use the battery in temperatures between -15°C and +50°C (5°F and 122°F). • Only charge the battery in temperatures between 10°C and 45°C (50°F and 113°F). • When the power supply (AC adapter) is used, the battery must not be charged at an ambient temperature above 35 °C (95°F). • Do not attach the battery directly to a car's cigarette lighter socket. Use the adapter that FLIR Systems supplies. • When the battery is worn, apply insulation to the terminals with adhesive tape or equivalent materials before you discard it. 	
	CAUTION
<p>When you connect the power supply to a mains socket, select a socket that is easy to access. Should a hazardous situation occur, you must be able to easily disconnect the power supply.</p>	

1.3 Handling and operation

	WARNING
<p>The camera must not be accessible to children. The camera includes a coin cell battery. If swallowed, a coin cell battery can cause injury or death.</p>	
	CAUTION
<p>If you do not obey these Cautions, damage to the equipment can occur.</p> <ul style="list-style-type: none"> • Make sure the beams from strong energy sources (for example, the sun or devices that emit laser radiation) do not go into the camera lens or the viewfinder. • Do not use the camera in temperatures more than 50°C (122°F). • Do not apply solvents or equivalent liquids to the camera, the cables, or other items. • Be careful and do not use too much force when you clean the infrared lens. The lens has an anti-reflective coating which is easily damaged. 	

Note The encapsulation rating is only applicable when the cover for the connector compartment is closed and locked in place and when the battery is correctly installed.

1.4 Declaration of conformity

The full text of the Declaration of conformity is available at the following internet address:
<https://support.flir.com/resources/2758>.

2.1 Register your camera

Register your camera to receive an extended warranty and other related benefits.

To register the camera, go to <http://support.flir.com/camreg>.

To access the registration form, you must log in to your FLIR account or sign up for a new account.

You will also need the serial number of your camera. The serial number is displayed by the registration wizard in the camera.

To start the registration wizard, turn on the camera and select *Settings > Device settings > Camera information > Register camera*.

To complete the registration, you must enter a verification code into the camera. The code is available in your FLIR account, under *My Products*.

2.2 Online documentation

Our manuals are continuously updated and published online.

To access the FLIR Ex Pro series user manual and other product documentation, go to <https://support.flir.com/resources/2758>.



To access the manuals for our other products, as well as manuals for our discontinued products, go to <https://support.flir.com/resources/app>.

2.3 About this manual

FLIR Systems issues generic manuals that cover several models within a camera series. This means that this manual may contain descriptions and explanations that do not apply to your particular camera model.

The authoritative version of this publication is English. In the event of divergences due to translation errors, the English text has precedence. Any late changes are first implemented in English.

2.4 Support

Contact our Technical Support Center if you experience problems or have any questions about your product: <https://support.flir.com>.

2.5 Training

For training resources and courses, go to <https://www.flir.com/support-center/training>.

Note Before operating the camera, you must read, understand, and follow the warnings and cautions in section 1 *Safety information*.

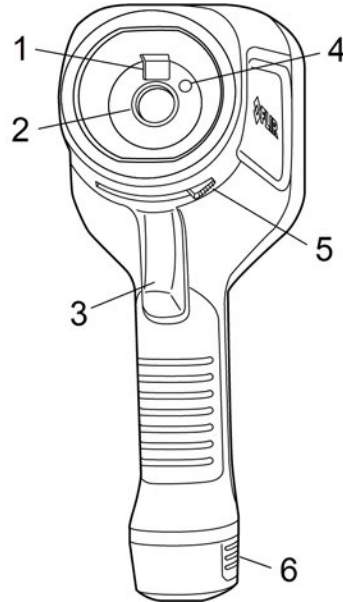
1. Charge the battery.
2. Push the battery into the camera battery compartment.
3. Push the On/Off button to power on the camera.
4. Follow the instructions on the camera screen to set up the camera according to your preferences.

You can also set up the camera to upload images for storage online. To enable upload of images, you need to connect the camera to the internet and pair the camera with a FLIR Ignite account. Use a computer or other device with internet access and follow the instructions on the camera screen.

Note You can select the settings as a part of the initial setup of the camera or later at any time via the *Settings* menu.

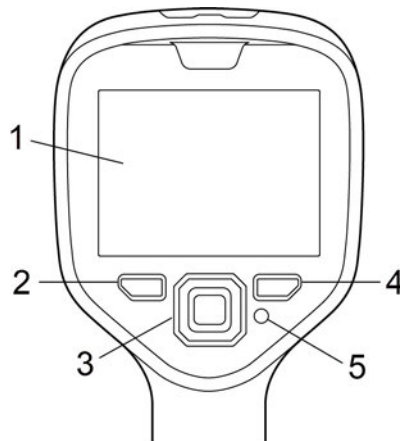
5. To measure a temperature, aim the camera toward the object. Make sure the spotmeter is on the point of interest. The spotmeter temperature is displayed on the screen.
6. To save an image, pull the trigger.

4.1 View from the front



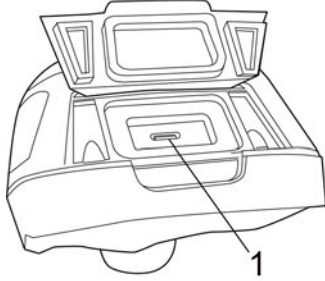
1. Digital camera
2. Infrared lens
3. Trigger to save an image
4. Camera lamp
5. Lever to open and close the lens cap
6. Battery

4.2 View from the rear



1. Touch screen
2. Archive button
3. Navigation pad
4. Back button
5. On/Off button

4.3 Connector compartment



1. USB port

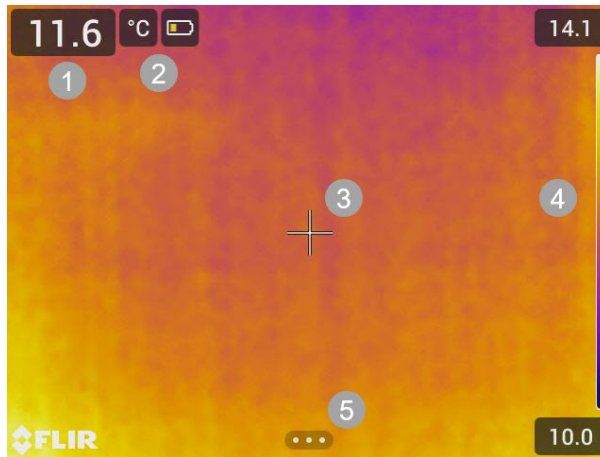
4.4 Serial number

A label with the serial number is visible when the battery is removed.

The serial number is available in the camera settings. Select *Settings > Device settings > Camera information*.



5.1 Screen elements

5.1.1 General

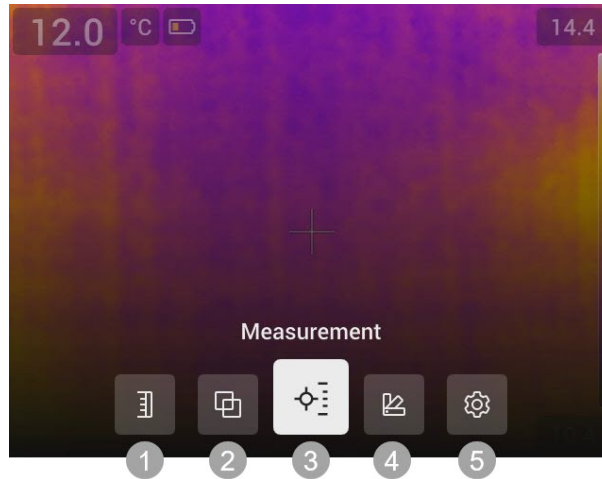


1. Result table
2. Status icons and indicators
3. Spotmeter
4. Temperature scale
5. Menu button

5.1.2 Status icons and indicators

	Battery level <ul style="list-style-type: none"> • Green: above 75% • Yellow: up to 75% • Red: up to 25% • No color: below 15%
	The available storage space in the camera memory is running low.

5.2 Main toolbar



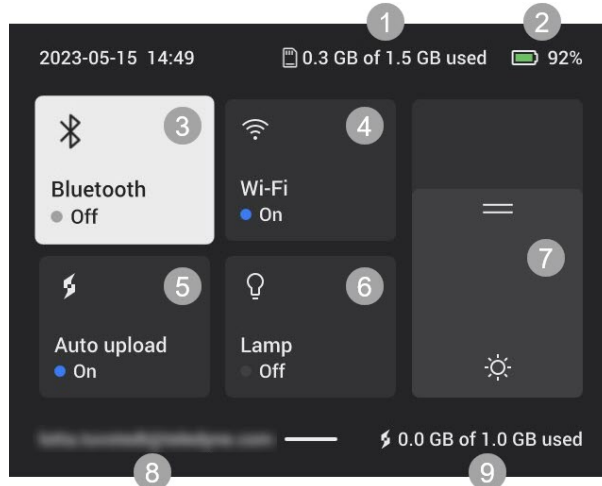
1. Temperature scale
2. Image mode
3. Measurement
4. Color
5. Settings

5.2.1 Navigation

To navigate the user interface, you can use the touch screen and/or the navigation pad and Back button.

- To display the main toolbar, do one of the following:
 - Tap the menu button at the bottom of the screen.
 - Push the center of the navigation pad.
- To navigate the toolbars, menus, and dialog boxes, and to change values in dialog boxes, push the navigation pad up/down or left/right.
- To confirm changes and settings in menus and dialog boxes, push the center of the navigation pad.
- To leave dialog boxes and to go back in the menu system, push the Back button.

5.3 Quick menu



1. Storage status of the camera memory.
2. Battery level.
3. Enable/disable Bluetooth or open the Bluetooth settings menu. See also section 12.2 *Bluetooth*.
4. Enable/disable Wi-Fi or open the Wi-Fi settings menu. See also section 12.1 *Wi-Fi*.
5. Enable/disable automatic upload of images. See also section 11.5 *Automatic upload*.

Note If the camera is not paired with a FLIR Ignite account, you will be prompted to sign in to FLIR Ignite before you can enable automatic upload.
6. Turn on/off the camera lamp.
7. Adjust the brightness of the screen.
8. The FLIR Ignite user account that the camera is paired with. For more information, see section 11.4 *Pair with FLIR Ignite*.
9. Storage status of the FLIR Ignite account.

5.3.1 Navigation

To display the Quick menu, swipe down from the top of the screen.

To navigate the Quick menu by using the touch screen, do the following:

- Tap to enable/disable a function.
- *Bluetooth* and *Wi-Fi*: Tap and hold to open the settings menu.
- Screen brightness: Tap the screen to adjust the screen brightness.

To navigate the Quick menu by using the navigation pad, do the following:

- Push the navigation pad up/down or left/right to highlight a function.
- Push the center of the navigation pad to enable/disable the highlighted function.
- *Bluetooth* and *Wi-Fi*: Push and hold the center of the navigation pad to open the settings menu.
- Screen brightness: Push the navigation pad up/down to adjust the screen brightness.

To close the Quick menu, push the Back button.

6.1 Safety information

Before operating the camera, you must read, understand, and follow the warnings and cautions in section 1 *Safety information*.

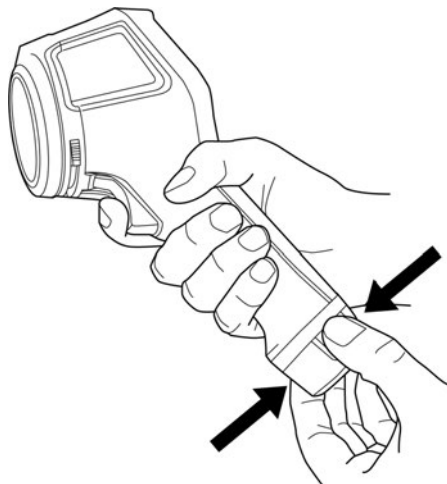
6.2 Battery

6.2.1 Install the battery

Push the battery into the battery compartment.

6.2.2 Remove the battery

1. Power off the camera.
2. Remove the battery from the camera.



6.3 Battery charging



CAUTION

When you connect the power supply to a mains socket, select a socket that is easy to access. Should a hazardous situation occur, you must be able to easily disconnect the power supply.

Note It is good practice to disconnect the power supply from the mains socket when not in use.

6.3.1 Charge the battery using the battery charger

1. Put the battery in the battery charger.
2. Connect the power supply to the battery charger.
3. Connect the power supply to a mains socket.

6.3.1.1 Battery charger indicator

- During the charging, the light on the battery charger is flashing.
- When the battery is fully charged, the light is steady.

6.3.2 Charge the battery in the camera — using the power supply

1. Open the cover at the top of the camera.
2. Connect the power supply to the camera.
3. Connect the power supply to a mains socket.

6.3.3 Charge the battery in the camera — via a computer

1. Open the cover at the top of the camera.
2. Connect the camera to a computer, using the USB cable.
3. Power on the camera.

Note Charging the battery via a computer takes considerably longer time than using the battery charger or power supply.

6.4 Power on/off

6.4.1 Power on

To power on the camera, push the On/Off button.

6.4.2 Standby

When the camera is in on and in live mode, push the On/Off button. This puts the camera in standby mode.

You can also set up the camera to enter standby mode after a period of inactivity. Select *Settings > Device settings > Auto power off*.

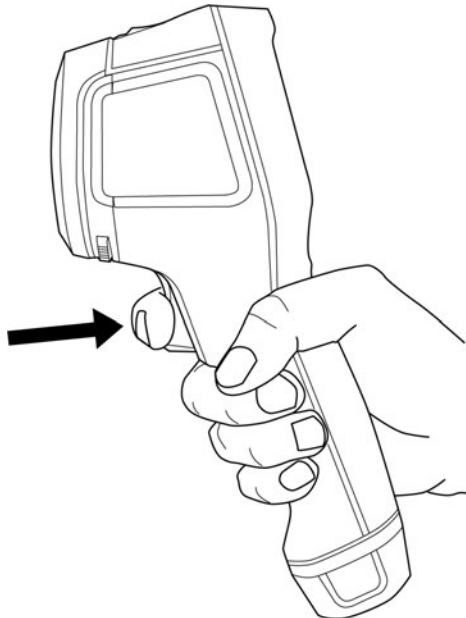
6.4.3 Power off

To power off the camera, push and hold the On/Off button.

Note Do not remove the battery to power off the camera.

6.5 Save an image

To save an image, pull the trigger.



6.6 File transfer

You can transfer the files from the camera using one of the following methods:

- Connect the camera to a computer with a USB cable.
- Upload the files to cloud storage, see section 11 *Cloud connectivity*.

6.6.1 Transfer files via USB cable

1. Open the cover at the top of the camera.
2. Connect the camera to the computer, using the USB cable.
3. Power on the camera.
4. Move the files to the computer using a drag-and-drop operation.

Note This does not delete the files in the camera.

6.7 Camera lamp

You control the camera lamp on the Quick menu, see section 5.3 *Quick menu*.

6.8 Streaming

The camera can stream what is currently visible on its screen to a computer via USB, just as a connected web camera. Use a FLIR Thermography software or a third party web camera software to display the image stream on the computer.

The camera supports radiometric and non-radiometric streaming. For radiometric streaming, a FLIR Thermography software is required.

To stream images from the camera to a computer, do the following:

1. Connect the camera to the computer, using the USB cable.
2. Start the streaming application on your computer and follow the instructions.

Image modes

The camera can capture thermal and visual images at the same time. By choosing the image mode, you select which type of image to display on the screen.

The camera supports the following image modes:

- *Thermal MSX* (Multi Spectral Dynamic Imaging): An infrared image where the edges of the objects are enhanced with visual image details.
- *Thermal*: An infrared image.
- *Picture in picture*: An infrared image frame is displayed on top of the visual image.
- *Digital camera*: The visual image captured by the digital camera.

Note

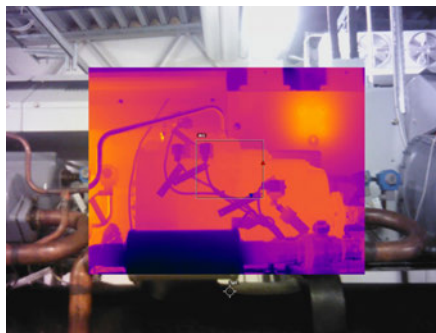
- For the *Thermal MSX*, *Thermal*, and *Picture in picture* modes, all thermal and visual information is stored when an image is saved. This means that you can edit the image later, in the camera image gallery or in a FLIR Thermography software, and select any of the image modes.
- For the *Digital camera* image mode, a digital image with full resolution is stored when an image is saved. However, no thermal information is stored.
- You can choose to turn off the digital camera. This can, for example, be required in restricted areas and in confidential situations. Select *Settings > Save options & storage > Digital camera = Off*. When the digital camera is off, only the image mode *Thermal* is enabled.



Thermal MSX



Thermal



Picture in picture



Digital camera

7.1 Change image mode

To change the image mode, select *Image mode* on the main toolbar. This displays a toolbar where you can select the image mode.

7.2 Align the thermal and visual images

In *Thermal MSX* and *Picture in picture* modes, the camera displays a combination of thermal and visual images. When looking at an object close up or far away, you may need to adjust the distance setting in the camera to align the thermal and visual images.

To align the thermal and visual images, do the following:

1. Tap the screen. This displays a box with a distance in the upper right corner.
2. Tap the distance box. This displays a slider.
3. Tap the slider or push the navigation pad up/down to adjust the distance.

7.3 Move and resize the infrared image frame

If *Picture in picture* mode is selected, you can move and resize the infrared image frame.

1. Tap a corner of the infrared image frame. The frame is now displayed with handles in the center and in the corners.
2. To move the frame, tap and hold the center handle and drag the frame.
3. To resize the frame, tap and hold one of the corner handles and drag the corner of the frame.

8.1 Basic steps to temperature measurements

- Select a temperature range that matches the expected temperature of the object you are inspecting.
- Adjusting the temperature scale manually can make it possible to detect anomalies and smaller temperature differences in the part of the image of interest.
- Selecting a different color palette can make it easier to analyze the image.
- For accurate temperature measurements, it is important to use appropriate measurement parameters.
- For very accurate results, wait 5 minutes after you have started the camera before measuring a temperature.

8.2 Measurement tools

To measure a temperature, you can use different measurement tools, e.g., a spot or a box.



1. Result table
2. Hot spot box
3. Temperature scale

8.2.1 Add and remove a tool

On the main toolbar, select *Measurement*. This displays a toolbar, where you can add the following tools or remove all tools:

- Center spot
- Hot spot box
- Cold spot box
- Hot spot - Spot
- Hot spot - Temp (Delta T)

8.2.2 Move a spot

1. Activate edit mode by tapping the spot on the screen. The spot is now displayed with a handle.
2. Push the navigation pad or tap the menu button. This displays a toolbar.

3. On the toolbar, do one or more of the following:

- Select *Move* and push the navigation pad. Push the navigation pad up/down and left/right to move the tool.
You can also tap and drag the spot.
- Select *Center* to center the spot on the screen.
- To exit edit mode, do one of the following:
 - Push the navigation pad and select *Done*.
 - Tap the screen outside the tool.

8.2.3 Move and resize a box

1. Activate edit mode by tapping one of the corners of the box. The box is now displayed with handles in the center and in the corners.
2. Push the navigation pad or tap the menu button. This displays a toolbar.
3. Select *Move/resize*. This displays a toolbar, where you can do one or more of the following:
 - Select *Resize* and push the navigation pad. Push the navigation pad up/down and left/right to resize the tool.
You can also tap and hold one of the corner handles and drag the corner to resize the tool.
 - Select *Move* and push the navigation pad. Push the navigation pad up/down and left/right to move the tool.
You can also tap the middle handle and drag to move the tool.
 - Select *Center* to center the box on the screen.
4. To exit edit mode, do one of the following:
 - Push the navigation pad and select *Done*.
 - Tap the screen outside the tool.

8.2.4 Difference calculations (delta)

A difference calculation gives the delta between the maximum temperature in a box and a fixed-temperature reference or a spot temperature.

The delta, box maximum, and reference/spot temperatures are displayed in the result table.

8.2.4.1 Delta T — Hot spot - Temp

The Delta T function calculates the difference between the maximum temperature in a box and a fixed-temperature reference.

To use the Delta T function, do the following:

1. On the main toolbar, select *Measurement > Hot spot - Temp*. This displays a dialog box with the reference temperature.
2. To change the reference temperature, push the navigation pad up/down. To confirm, push the center of the navigation pad.

8.2.4.2 Hot spot - Spot

The Hot spot - Spot function calculates the difference between the maximum temperature in a box and a spot temperature.

To use this function, select *Measurement > Hot spot - Spot* on the main toolbar.

8.2.5 Display box values in the result table

For the box tool, you can set the camera to display the maximum, minimum, and average values in the result table.

To display values in the result table, do the following:

1. Activate edit mode by tapping one of the corners of the box. The box is now displayed with handles in the center and in the corners.
2. Push the navigation pad or tap the menu button. This displays a toolbar.
3. Select *Max/Min/Avg*. This displays a toolbar, where you can enable/disable one or more of the following:
 - *Max*: Display the maximum value.
 - *Min*: Display the minimum value.
 - *Avg*: Display the average value.
 - *Max & min markers*: Display the maximum and minimum markers (hot/cold spots).
4. To toggle between enabled/disabled, push the navigation pad or tap the toolbar button.
5. When completed, do one of the following:
 - Push the Back button. On the toolbar, select *Done*.
 - Tap the screen outside the tool.

8.3 Temperature range

The camera is calibrated for different temperature ranges. For accurate temperature measurements, you must select a temperature range that matches the expected temperature of the object you are inspecting.

To change the temperature range, select *Settings > Camera temperature range*. This displays a menu where you can select the temperature range.

8.4 Thermal image adjustment

8.4.1 General

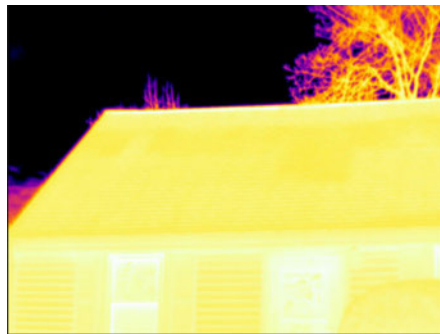
Thermal image adjustment, or thermal tuning, means adjusting the temperature scale of a thermal image, in order to maximize the brightness and contrast in the image.

In automatic mode, the camera continuously adjusts the image for the best presentation. The camera selects the coldest and warmest temperatures in the image as the lower and upper limits of the temperature scale. The colors are then distributed over that temperature interval (histogram color distribution).

In manual mode, you can adjust the temperature scale to values close to the temperature of a specific object in the image. The colors are distributed evenly from the lowest to the highest temperature (linear color distribution).

8.4.1.1 When to use manual mode

Here are two infrared images of a building. In the left image, which is auto-adjusted, the large temperature span between the clear sky and the heated building makes a correct analysis difficult. You can analyze the building in more detail if you change the temperature scale to values close to the temperature of the building.

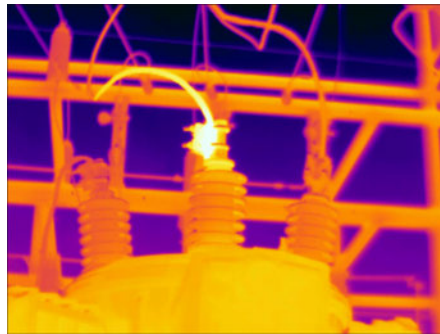


Automatic



Manual

Here are two infrared images of an isolator in a power line. To make it easier to analyze the temperature variations in the isolator, the temperature scale in the right image has been changed to values close to the temperature of the isolator.



Automatic



Manual

8.4.2 Change mode

To change the image adjustment mode, select *Temperature scale* on the main toolbar. Then select *Auto* or *Manual*.

8.4.3 Manual adjustment by touching the screen

When manual mode is active, an adjustment wheel is displayed to the right of the temperature scale.

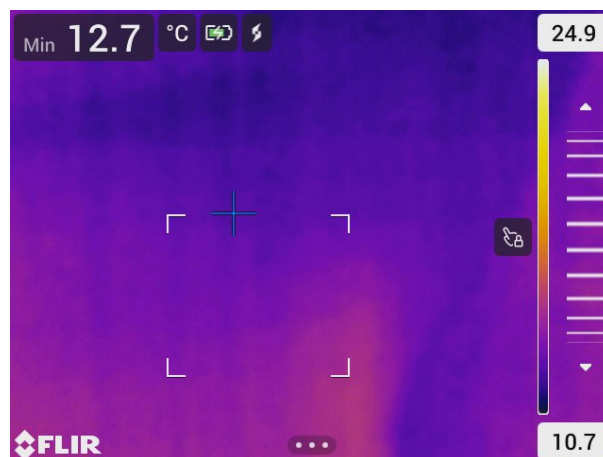


Figure 8.1 Manual adjustment mode active

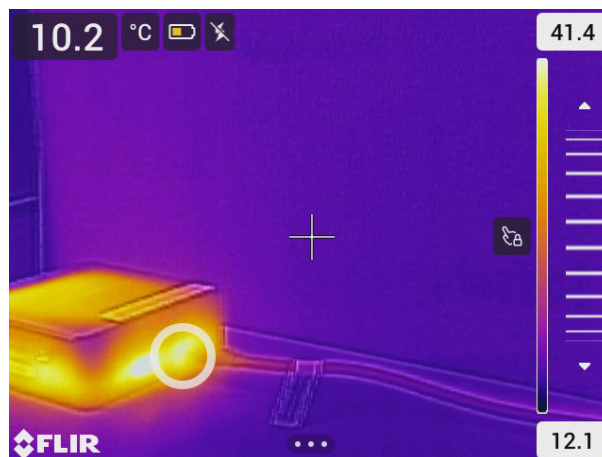
To manually adjust the image, do the following:

1. To enter manual adjustment mode, select *Temperature scale > Manual* on the main toolbar.
2. To simultaneously change the maximum and minimum limits of the temperature scale, place your finger on the screen and move it up/down.
3. To change the maximum or minimum limit, do the following:
 - 3.1. Tap the maximum or minimum temperature.
 - 3.2. Place your finger on the screen and move it up/down to change the value of the highlighted temperature.

8.4.3.1 1-Touch auto-adjustment

In manual mode, you can auto-adjust the image by touching the screen. The image will be auto-adjusted based on the thermal content of the area around the touched point. The top and bottom levels in the temperature scale will be set to the maximum and minimum temperatures in that area.

By using the color information only for the relevant temperatures, you will get more details in your area of interest.



8.4.3.2 Lock touch screen

When you have adjusted the image to levels that allow you to study your area of interest, you can lock the touch screen to prevent further unintentional adjustments.

To lock/unlock the screen, tap the icon to the left of the temperature scale.

Note If you switch to automatic mode, the screen automatically unlocks and your manual adjustments are lost.

8.4.4 Manual adjustment using the navigation pad

8.4.4.1 Manual adjustment modes

There are two different settings for the manual adjustment mode (applicable for the navigation pad only):

- *Level, Max, Min*: With this setting, you can manually adjust the level with the navigation pad. You can also change the upper and lower temperatures individually.
- *Level, Span*: With this setting, you can manually adjust the level and span with the navigation pad.

To change the type of manual adjustment mode, select *Settings > Device settings > User interface options > Manual adjustment mode*.

8.4.4.2 Manual adjustment in Level, Max, Min mode

1. To enter manual adjustment mode, select *Temperature scale > Manual* on the main toolbar.
2. To simultaneously change the temperature scale minimum and maximum limits, push the navigation pad up/down.
3. To change the minimum or maximum limit, do the following:
 - Push the navigation pad left/right to select (highlight) the maximum or minimum temperature.
 - Push the navigation pad up/down to change the value of the highlighted temperature.

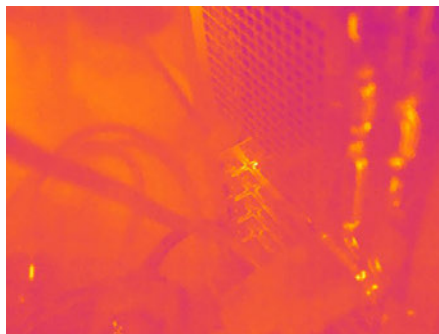
8.4.4.3 Manual adjustment in Level, Span mode

1. To enter manual adjustment mode, select *Temperature scale > Manual* on the main toolbar.
2. Push the navigation pad up/down to increase/decrease the level.
3. Push the navigation pad left/right to increase/decrease the span.

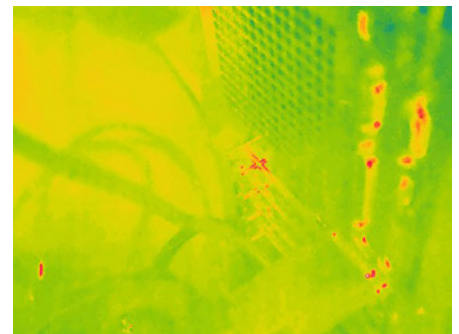
8.5 Color palettes

The camera supports a number of different color palettes. Frequently used palettes include the iron, gray, and rainbow palettes.

- The iron palette is intuitive and also easy to understand for those without much experience in thermography. It offers a good balance between geometric and thermal resolution.
- Gray tones are particularly suited to resolving small geometric details, but are less suited to displaying small differences in temperature.
- The rainbow palette is more colorful and alternates between light and dark colors. This results in greater contrast, but this can lead to a noisy image for objects with different surfaces or many temperatures.



Iron



Rainbow



Gray (White hot)



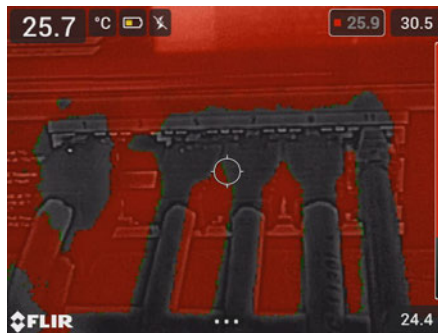
Gray (Black hot)

8.5.1 Change the color palette

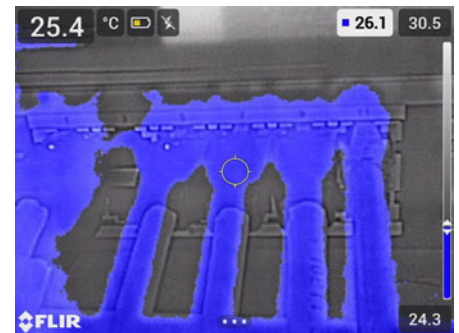
On the main toolbar, select *Color*. This displays a toolbar where you can select a color palette.

8.6 Color alarms and isotherms

By using color alarms (isotherms), anomalies can easily be discovered in an infrared image. The isotherm command applies a contrasting color to all pixels with a temperature above or below the specified temperature level.



Above alarm: Highlights all pixels with a temperature above the specified temperature level.



Below alarm: Highlights all pixels with a temperature below the specified temperature level.

8.6.1 Set up a color alarm

On the main toolbar, select *Color*. This displays a toolbar where you can select the *Above alarm* or *Below alarm*.

The threshold temperature is displayed in the upper right corner of the live image.

To change the threshold temperature, push the navigation pad up/down. To lock/unlock the setting, tap the threshold temperature button. The button background is black when the setting is locked and white when unlocked.

8.7 Measurement parameters

For accurate temperature measurements, it is important to use appropriate measurement parameters:

- *Emissivity*: The emissivity determines how much of the radiation originates from the object as opposed to being reflected by it.
- *Reflected temperature*: This parameter is used to compensate for the radiation from the surroundings reflected by the object into the camera.
- *Relative humidity*: The relative humidity of the air between the camera and the object of interest.
- *Atmospheric temperature*: The temperature of the air between the camera and the object of interest.
- *Distance*: The distance between the camera and the object of interest.

Note During normal operation there is typically no need to change the default measurement parameters, see section 8.7.2 *Recommended values*, page 23.

8.7.1 Setting measurement parameters

Emissivity is the most important measurement parameter to set correctly. If the *Emissivity* is set to a low value, the *Reflected temperature* also becomes important. The parameters *Relative humidity*, *Atmospheric temperature*, and *Distance* are relevant for longer distances.

To set the measurement parameters, do the following:

1. On the main toolbar, select *Settings > Measurement parameters*.
2. Select the measurement parameter you want to change.
3. Select the appropriate parameter setting.

8.7.2 Recommended values

If you are unsure about the measurement parameter values, the following are recommended:

Emissivity	0.95
Reflected temperature	20°C (69°F)
Relative humidity	50%
Atmospheric temperature	20°C (69°F)
Distance	1 m (3.3 ft.)

9.1 Save an image

To save an image, pull the trigger.

When you save an image, the camera stores the image file in the camera memory. You can also set up the camera to upload images for storage online, see section 11 *Cloud connectivity*, page 29.

9.2 Save a high-resolution visual image

Select the *Digital camera* image mode to save a high-resolution visual image. Note that no thermal information is stored when in this image mode.

9.3 About image files

When an image is saved in one of the image modes *Thermal MSX*, *Thermal*, or *Picture in picture*, the saved image file contains all thermal and visual information. This means that you can open an image file, in the camera or in a FLIR Thermography software, and, for example, change the color palette, apply another image mode, and add measurement tools.

When an image is saved in the *Digital camera* image mode, a high-resolution image containing only the visual information is saved.

9.3.1 File-naming convention

The default naming convention for image files is FLIRxxxx, where xxxx is a unique counter.

To reset the numbering of the image filenames, select *Settings > Device settings > Reset options > Reset image counter...* This displays a dialog box where you can select to reset the counter.



Note To prevent image files being overwritten, the new counter value will be based on the highest existing filename number in the camera memory. To ensure that the counter is reset to 0001, delete all images from the camera memory before resetting the counter.

9.4 Add a note



To make reporting and post-processing more efficient, you can add notes with additional information, e.g., conditions and information about where an image is taken. The notes are added to the image file and can be viewed and edited in the camera or in a FLIR Thermography software.

You can set up the camera to automatically prompt for a note when an image has been saved. Select *Settings > Save options & storage > Add note after saving = On*.

You can also add notes to saved images in the image archive, by doing the following:

1. Open the image in the *Gallery*.
2. Push the navigation pad or tap the screen. This displays the top toolbar.
3. On the top toolbar, select . This displays the right toolbar.
4. On the right toolbar, select . This displays a soft keyboard, where you can enter text by touching the screen.
5. When completed, tap *Done* on the soft keyboard.
6. To get the note stored online, make a manual upload of the image. See section 11.6 *Manual upload*.

9.5 Edit a saved image

1. Open the image in the *Gallery*.
2. Push the navigation pad or tap the screen to display the top toolbar.
3. On the top toolbar, select .
4. On the right toolbar, select . This opens the image in edit mode.
5. Manual adjustment mode is now active. For image adjustment instructions, see section 8.4 *Thermal image adjustment*.
6. Push the navigation pad or tap the screen. This displays a toolbar, where you can do the following:
 - Exit edit mode.
 - Change the measurement parameters.
 - Change the image mode.
 - Add a measurement tool.
 - Change the color palette or set a color alarm.
 - Save and exit edit mode.
7. To get the edited image stored online, make a manual upload of the image. See section 11.6 *Manual upload*.

9.6 Zoom

You can zoom an image by using the camera's digital zoom function. You can do this on live images and on saved images in edit mode. While zooming in edit mode, you can also pan the image.

- **Zoom:** Place two fingers on the screen and pinch in or stretch out.
- **Pan:** While in edit mode and after zooming in, place one finger on the screen and move the finger.



When you save an image, the camera stores the image file in the camera memory. You can open an image and, for example, change the color palette, apply another image mode, and add measurement tools.

In the camera, the image archive is called *Gallery*. The *Gallery* can include one or several folders. New images will be saved to the active folder, at the top level of the *Gallery*. You can create new folders, rename a folder, change the active folder, move files between the folders, and delete folders.


10.1 Open the Gallery

To open the *Gallery*, push the Archive button.



10.2 Open image files

1. Go to a folder in the *Gallery*.
2. Select the image you want to view.
3. To view the previous/next image, push the navigation pad left/right or swipe left/right on the screen.
4. To display the top toolbar, push the navigation pad or tap the screen.
5. To switch between the thermal image and visual image, select  on the top toolbar.
6. To edit the image, add annotations, display information, or delete the image, select . This displays the right toolbar.

10.3 Add a folder


1. Go to the top level in the *Gallery*.
2. On the top toolbar, select .
3. Enter a folder name. Then select *Done*.
4. The new folder automatically becomes the active folder and appears at the top of the *Gallery*.


10.4 Rename a folder

1. Go to the top level in the *Gallery*.
2. On the top toolbar, select .
3. Select the folder to rename.
4. On the right toolbar, select .
5. Enter the new name. Then select *Done*.



10.5 Change the active folder

New images are saved to the active folder.

1. Go to the top level in the *Gallery*.
2. On the top toolbar, select .

-
3. Select the folder that new images should be saved to.
 4. On the right toolbar, select .
 5. The selected folder is moved to the top of the *Gallery*.

10.6 Move files between folders



1. Go to a folder in the *Gallery*.
2. On the top toolbar, select .
3. Select the files you want to move.
4. On the right toolbar, select .
5. Select the destination folder.

10.7 Upload files and folders



You can manually upload images and folders to your FLIR Ignite account when the camera is connected to the internet. For more information, see section 11.6 *Manual upload*.

10.8 Delete files and folders



10.8.1 Delete folders

1. Go to the top level in the *Gallery*.
2. On the top toolbar, select .
3. Select the folders you want to delete.
4. On the right toolbar, select . This displays a dialog where you can select to delete the selected folders.

10.8.2 Delete a file

1. Open the file in the *Gallery*.
2. Push the navigation pad or tap the screen to display the top toolbar.
3. On the top toolbar, select .
4. On the right toolbar, select . This displays a dialog where you can select to delete the file.

10.8.3 Delete multiple files

1. Go to a folder in the *Gallery*.
2. On the top toolbar, select .
3. Select the files you want to delete.
4. On the right toolbar, select . This displays a dialog where you can select to delete the selected files.

10.8.4 Delete all files

To delete all files from the camera memory, select *Settings > Save options & storage > Delete all saved files....* This displays a dialog box where you can select to permanently delete all saved files in the camera memory.

FLIR Ignite is a cloud storage service for thermal images. Upload images from your camera and your data will be instantly available on your computer and mobile devices. With FLIR Ignite you can edit images and create basic reports. You can also share images with colleagues and clients and invite team members to work in the same folder and files.

FLIR Ignite also includes a PC-based application called FLIR Ignite Sync that allows you to sync your image library with your computer. This gives you easy access to images when creating reports in FLIR Thermal Studio or other post-processing software.

11.1 Setup

You can set up the camera to upload images to FLIR Ignite.

If automatic upload is enabled, new images will automatically be uploaded to the FLIR Ignite account. You can also upload files manually from the *Gallery*.

To be able to upload images, you need to connect the camera to the internet and pair the camera with a FLIR Ignite account.

11.2 Create FLIR Ignite account

To create a FLIR Ignite account, go to <https://ignite.flir.com> and click *Sign up*.

11.3 Connect camera to internet

You can connect the camera to the internet via Wi-Fi. For more information, see section 12.1 *Wi-Fi*.

11.4 Pair with FLIR Ignite

1. Make sure the camera is connected to the internet.
2. On the *Settings* menu, select *FLIR Ignite*.
3. Start the pairing procedure by selecting *Sign in*.
4. Use a computer or other device with internet access and go to the website displayed on the camera screen.
5. On the website, enter the code displayed on the camera screen.
6. Sign in to your FLIR Ignite account.

11.5 Automatic upload

You can set up the camera to automatically upload images to your FLIR Ignite account.

When automatic upload is enabled, new images will automatically be uploaded when the camera is connected to the internet and paired with FLIR Ignite.

To enable automatic upload, do the following:

1. Make sure the camera is paired with your FLIR Ignite account.
2. Do one of the following:
 - On the *Quick* menu, tap the *Auto upload* button.
 - On the *Settings* menu, select *FLIR Ignite > Auto upload = On*.

11.6 Manual upload



You can manually upload files and folders from the *Gallery* when the camera is paired with a FLIR Ignite account and connected to the internet.

You can monitor the upload progress at the top of the *Gallery*.



Note Before uploading, make sure that:

- The camera is connected to the internet.
- The camera is paired with a FLIR Ignite account.



11.6.1 Upload a file

1. Open the file in the *Gallery*.
2. Push the navigation pad or tap the screen to display the top toolbar.
3. On the top toolbar, select .
4. On the right toolbar, select .

11.6.2 Upload multiple files

1. Go to a folder in the *Gallery*.
2. On the top toolbar, select .
3. Select the files you want to upload.
4. On the right toolbar, select .

11.6.3 Upload folders

1. Go to the top level in the *Gallery*.
2. On the top toolbar, select .
3. Select the folders you want to upload.
4. On the right toolbar, select .

11.7 Access FLIR Ignite

You can access FLIR Ignite from a browser on your desktop, tablet, or mobile device.

To access FLIR Ignite, go to <https://ignite.flir.com>.

For more information, refer to the FLIR Ignite user manual.

12.1 Wi-Fi

You can connect the camera to a Wi-Fi network.

The Wi-Fi functionality is managed on the *Settings* menu. You can also enable/disable Wi-Fi on the Quick menu.

12.1.1 Connect the camera to Wi-Fi

You can connect the camera to a Wi-Fi network as part of the initial setup of the camera. You can also connect the camera at any time via the *Settings* menu.

To connect to Wi-Fi via the *Settings* menu, do the following:

1. On the *Settings* menu, select *Connections* > *Wi-Fi*.
2. Select *Wi-Fi = On*.
3. Select one of the available networks.

Note

- Password-protected networks are indicated with a padlock icon, and for these you will need to enter a password the first time you connect to the network. After that the camera will connect automatically to the network. To disable the automatic connection, select the network in the list and then select *Forget network*.
- Some networks do not broadcast their existence. They appear in the list as *Untitled*. To connect to such a network, you will be prompted to enter additional parameters.
- To enable/disable the camera firewall, select *Settings* > *Connections* > *Advanced* > *Global firewall*. It is recommended to keep the camera firewall enabled. Only disable the firewall when experiencing problems connecting to legacy applications.

12.2 Bluetooth

If supported by your mobile phone, you can share the phone's internet connection with the camera via Bluetooth.

The Bluetooth functionality is managed on the *Settings* menu. You can also enable/disable Bluetooth on the Quick menu.

12.2.1 Pair Bluetooth devices

1. On the *Settings* menu, select *Connections* > *Bluetooth*.
2. Select *Bluetooth = On*.

Note You also need to ensure that the external Bluetooth device is in visible mode. On the mobile phone, you must make sure that Bluetooth is enabled, that the phone is in discovery mode, and that Bluetooth tethering is enabled.

3. Select *Available devices*.
4. Wait until a list of available Bluetooth devices is displayed.
5. Select a device to begin the pairing procedure.

On the *Settings* menu, you can set up the camera according to your preferences and view information about your camera.

The *Settings* menu includes the following:

- *FLIR Ignite*
- *Measurement parameters.*
- *Connections*
- *Camera temperature range*
- *Save options & storage*
- *Device settings*

13.1 FLIR Ignite

Sign in to FLIR Ignite and view information about the FLIR Ignite account the camera is paired with.

Enable/disable automatic upload of images.

For more information about FLIR Ignite and online storage of images, see section 11 *Cloud connectivity*.

13.2 Measurement parameters

For accurate temperature measurements, it is important to use appropriate measurement parameters. For more information, see section 8.7 *Measurement parameters*.

13.3 Connections

Connect the camera to a Wi-Fi network. For more information, see section 12.1 *Wi-Fi*.

Pair the camera with a Bluetooth device. For more information, see section 12.2 *Bluetooth*.

Advanced settings for firewall, trusted applications, and streaming authentication.

13.4 Camera temperature range

The camera is calibrated for different temperature ranges. The available temperature range options depend on the camera model.

For accurate temperature measurements, you must select a temperature range that matches the expected temperature of the object you are inspecting.

13.5 Save options & storage

- *Photo as separate JPEG:* A visual image is always saved in the same JPEG file as the thermal image. Enabling this setting saves an extra low-resolution visual image as a separate JPEG file.
- *Add note after saving:* The note tool will be displayed when an image has been saved.
- *Digital camera:* Turn on/off the digital camera. Turning off the digital camera can, for example, be required in restricted areas and in confidential (e.g. doctor/patient) situations. When the digital camera is off, the images modes *Thermal MSX* and *Picture in picture* are disabled.
- *Delete all saved files...:* This displays a dialog box where you can select to permanently delete all saved files from the camera memory.

13.6 Device settings

- *Language, time & units*: Select the language, units, and date and time formats to be used in the camera.
- *Screen brightness*: Adjust the brightness of the screen.
Note You can also adjust the screen brightness on the Quick menu, see section 5.3 *Quick menu*.
- *Update*: Check for updates and install new firmware versions. The camera must be connected to the internet. See also section 15 *Updating the camera*.
- *Auto power off*: The period of inactivity before the camera enters standby mode.
- *User interface options*:
 - *Manual adjustment mode*: Select the type of manual image adjustment mode (applicable to the navigation pad). See also section 8.4.4 *Manual adjustment using the navigation pad*.
 - *Color theme*: Select light or dark theme for the user interface.
- *Reset options*:
 - *Reset default camera mode...*: This will affect the image mode, color palette, measurement tools, and measurement parameters. Saved images will not be affected.
 - *Reset device settings to factory default...*: This will affect all camera settings, including regional settings. Saved images will not be affected. The camera will be restarted and you will be prompted to set the regional settings.
 - *Reset image counter...*: This will reset the numbering of the images. The next number will be based on the highest existing number in the image archive.**Note** When a reset option is selected, a dialog box is displayed with more information. You can choose to execute the reset action or to cancel.
- *Camera information*: Information about the camera and regulatory information.

14.1 Calibration

We recommend that you send in the camera for calibration once a year. Contact your local sales office for instructions on where to send the camera.

14.2 Clean the camera

14.2.1 Camera housing, cables, and other items

Use one of these liquids:

- Warm water
- A weak detergent solution

Equipment:

- A soft cloth

Follow this procedure:

1. Soak the cloth in the liquid.
2. Twist the cloth to remove excess liquid.
3. Clean the part with the cloth.



CAUTION

Do not apply solvents or similar liquids to the camera, the cables, or other items. This can cause damage.

14.2.2 Infrared lens

Use one of these liquids:

- A commercial lens cleaning liquid with more than 30% isopropyl alcohol.
- 96% ethyl alcohol (C₂H₅OH).

Equipment:

- Cotton wool



CAUTION

If you use a lens cleaning cloth it must be dry. Do not use a lens cleaning cloth with the liquids that are listed above. These liquids can cause material on the lens cleaning cloth to become loose. This material can have an unwanted effect on the surface of the lens.

Follow this procedure:

1. Soak the cotton wool in the liquid.
2. Twist the cotton wool to remove excess liquid.
3. Clean the lens one time only and discard the cotton wool.



WARNING

Make sure that you read all applicable MSDS (Material Safety Data Sheets) and warning labels on containers before you use a liquid: the liquids can be dangerous.



CAUTION

- Be careful when you clean the infrared lens. The lens has a delicate anti-reflective coating.
- Do not clean the infrared lens too vigorously. This can damage the anti-reflective coating.

To take advantage of our latest camera firmware, it is important that you keep your camera updated.

There are several ways to update the camera:

- When the camera is connected to the internet, the camera automatically searches for firmware updates. Via the *Settings* menu, you can download and install new firmware versions Over-The-Air (OTA) when they become available.
- Connect the camera to a computer with a USB cable and use the FLIR Camera Updater application to update the camera.
- Download an update package and update the camera manually. For more information, go to <https://support.flir.com>.

15.1 Update the camera Over-The-Air (OTA)

Note If a new firmware version is available, there will be a notification on the *Settings* menu.

To install a new firmware version, do the following:

1. Make sure the camera battery is fully charged.
2. Make sure the camera has Wi-Fi enabled and is connected to the internet.
3. Select *Settings* > *Device settings* > *Update*.
4. If an update is available, select *Download* to download the installation package.
5. Select *Install* to start the installation.
6. When the installation is completed, the camera will automatically restart.

15.2 Update via USB cable with the FLIR Camera Updater

The FLIR Camera Updater is a Windows application used to update the camera.

To update your camera, you must log in to your FLIR account or sign up for a new account. You must also register the camera.

15.2.1 Install the FLIR Camera Updater

1. Go to <https://support.flir.com>. Find the software download area and search for FLIR Camera Updater.
2. Download the FLIR Camera Updater installer package.
3. Start the installation by double-clicking the executable installer file.
4. Follow the instructions in the setup wizard.

15.2.2 Connect the camera

1. Connect the camera to the computer, using the USB cable.
2. Turn on the camera.
3. Run the FLIR Camera Updater application.
4. Sign in to your FLIR account or sign up for a new account.
5. The application automatically connects to the camera.
6. If the camera is not registered, select *Product registration* and complete the registration.
7. If a newer firmware version is available, you can select to update the connected camera.

15.2.3 Update notifications

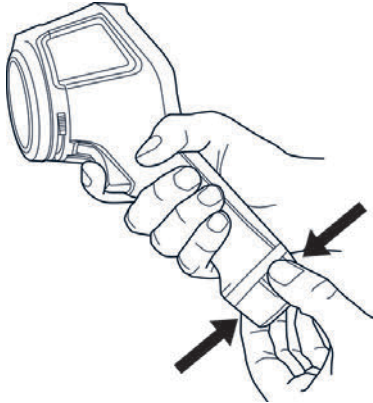
The FLIR Camera Updater can send notifications if there is a new update available for your previously connected devices.

Waste of Electrical and Electronic Equipment (WEEE) poses a risk to human health and the environment when not disposed of properly. This product should not be discarded as unsorted waste but must be sent to separate collection facilities for recovery and recycling. More information is available from the relevant local authority.



16.1 Battery removal

Before disposal of the camera, remove the battery.



Before you discard the battery, apply insulation to the terminals with adhesive tape or equivalent materials.

17.1 Legal disclaimer

For warranty terms, refer to <https://www.flir.com/warranty>.

17.2 Export controls

Products described herein may be subject to export regulations.

This document does not contain export-controlled information.

17.3 Patents

This product is protected by patents, design patents, patents pending, or design patents pending. Refer to the FLIR Systems' patent registry:

<https://www.flir.com/patentnotices>

17.4 Quality assurance

The Quality Management System under which these products are developed and manufactured has been certified in accordance with the ISO 9001 standard.

FLIR Systems is committed to a policy of continuous development; therefore we reserve the right to make changes and improvements on any of the products without prior notice.

17.5 Third-party licenses

Information about third-party licenses is available in the user interface of the product.

17.6 Usage statistics

FLIR Systems reserves the right to gather anonymous usage statistics to help maintain and improve the quality of our software and services.

17.7 Copyright

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