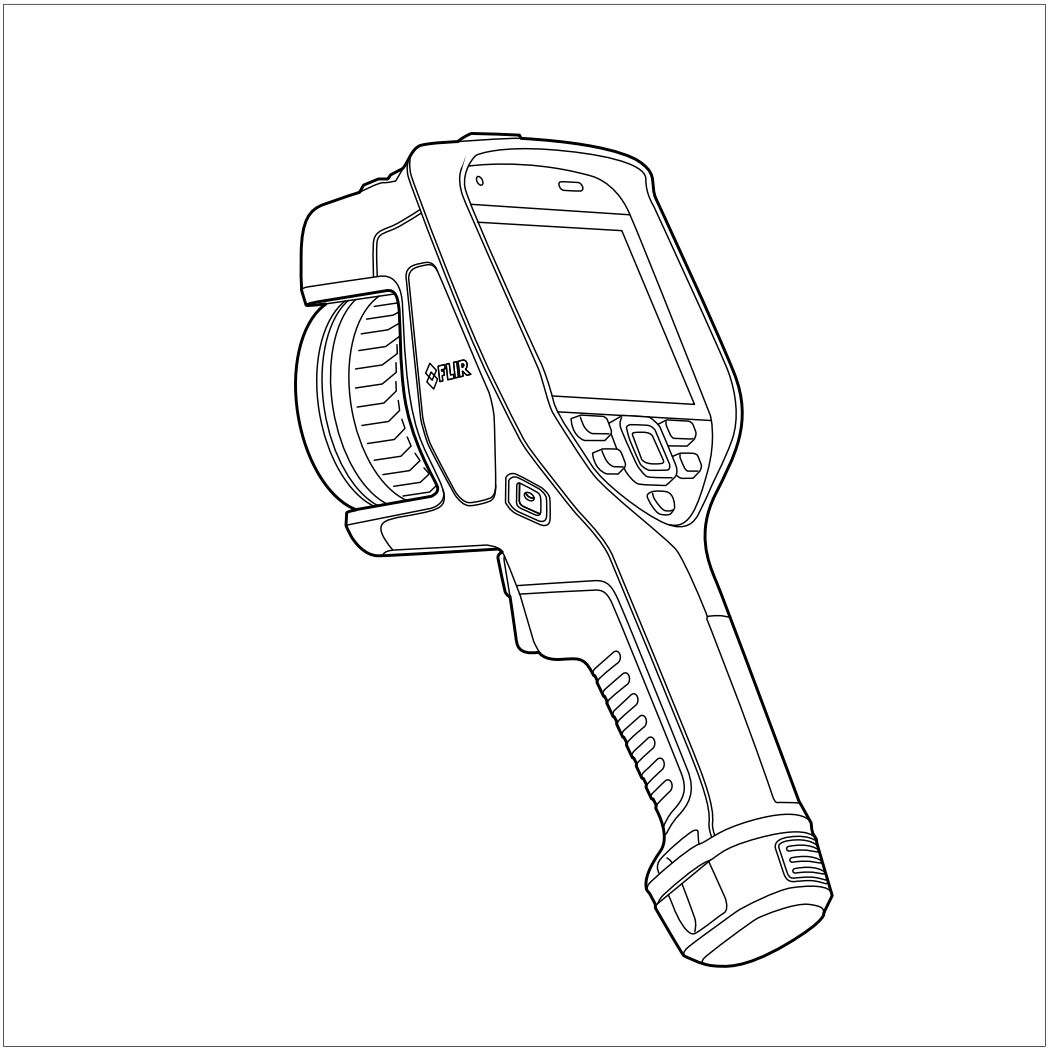
User's manual
FLIR Exx-EST series



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.

Vigtig meddelelse
Før du betjener enheden, skal du 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 renuncias 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 használata előtt 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, przestrogami 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.

重要注意事项
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。

Table of contents

1 Disclaimers

1.1 Legal disclaimer

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

1.2 U.S. Government Regulations

This product may be subject to U.S. Export Regulations. Send any inquiries to export-questions@flir.com.

1.3 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

1.4 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.

1.5 Third-party licenses

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

1.6 Usage statistics

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

1.7 Copyright

2 Safety information

WARNING

Applicability: Class B digital devices.

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:

- 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.

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:

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.

NOTICE: Changes or modifications made to this equipment not expressly approved by FLIR Systems may void the FCC authorization to operate this equipment.

WARNING

Applicability: Digital devices subject to 2.1091/2.1093/KDB 447498/RSS-102.

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.

WARNING

Do not look directly into the laser beam. The laser beam can cause eye irritation.

WARNING

Do not point the camera at the face of a person when the continuous autofocus function is on. The camera uses laser distance measurements (that are continuous) for the focus adjustments. The laser beam can cause eye irritation.

WARNING

Do not point the camera at the face of a person when you use the autofocus function. You can set the camera to use a laser distance measurement for the focus adjustment. The laser beam can cause eye irritation.

WARNING

Do not disassemble or do a modification to the battery. The battery contains safety and protection devices which, if damage occurs, can cause the battery to become hot, or cause an explosion or an ignition.

WARNING

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 if you do not do this.

WARNING

Do not continue to charge the battery if it does not become charged in the specified charging time. If you continue to charge the battery, it can become hot and cause an explosion or ignition. Injury to persons can occur.

WARNING

Only use the correct equipment to remove the electrical power from the battery. If you do not use the correct equipment, you can decrease the performance or the life cycle of the battery. If you do not use the correct equipment, an incorrect flow of current to the battery can occur. This can cause the battery to become hot, or cause an explosion. Injury to persons can occur.

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. Injury to persons can occur.

CAUTION

Do not point the infrared camera (with or without the lens cover) at strong energy sources, for example, devices that cause laser radiation, or the sun. This can have an unwanted effect on the accuracy of the camera. It can also cause damage to the detector in the camera.

CAUTION

Do not use the camera in temperatures more than +50°C (+122°F), unless other information is specified in the user documentation or technical data. High temperatures can cause damage to the camera.

CAUTION

Do not attach the batteries directly to a car's cigarette lighter socket, unless FLIR Systems supplies a specific adapter to connect the batteries to a cigarette lighter socket. Damage to the batteries can occur.

CAUTION

Do not connect the positive terminal and the negative terminal of the battery to each other with a metal object (such as wire). Damage to the batteries can occur.

CAUTION

Do not get water or salt water on the battery, or permit the battery to become wet. Damage to the batteries can occur.

CAUTION

Do not make holes in the battery with objects. Damage to the battery can occur.

CAUTION

Do not hit or cause shocks to the battery. Damage to the battery can occur.

CAUTION

Do not put the batteries in or near a fire, or into direct sunlight. When the battery becomes hot, the built-in safety equipment becomes energized and can stop the battery charging procedure. If the battery becomes hot, damage can occur to the safety equipment and this can cause more heat, damage or ignition of the battery.

CAUTION

Do not put the battery on or near fires, stoves, or other high-temperature locations. Damage to the battery and injury to persons can occur.

CAUTION

Do not solder directly onto the battery. Damage to the battery can occur.

CAUTION

Do not use the battery if, when you use, charge, or put the battery in storage, there is an unusual smell from the battery, the battery feels hot, changes color, changes shape, or is in an unusual condition. Speak with your sales office if one or more of these problems occurs. Damage to the battery and injury to persons can occur.

CAUTION

Only use a specified battery charger when you charge the battery. Damage to the battery can occur if you do not do this.

CAUTION

Only use a specified battery for the camera. Damage to the camera and the battery can occur if you do not do this.

CAUTION

The temperature range through which you can charge the battery is ±0°C to +45°C (+32°F to +113°F), except for the Korean market where the approved range is +10°C to + 45°C (+50°F to +113°F). If you charge the battery at temperatures out of this range, it can cause the battery to become hot or to break. It can also decrease the performance or the life cycle of the battery.

CAUTION

The temperature range through which you can remove the electrical power from the battery is -15°C to +50°C (+5°F to +122°F), unless other information is specified in the user documentation or technical data. If you operate the battery out of this temperature range, it can decrease the performance or the life cycle of the battery.

CAUTION

When the battery is worn, apply insulation to the terminals with adhesive tape or equivalent materials before you discard it. Damage to the battery and injury to persons can occur if you do not do this.

CAUTION

Remove any water or moisture on the battery before you install it. Damage to the battery can occur if you do not do this.

CAUTION

Do not apply solvents or equivalent liquids to the camera, the cables, or other items. Damage to the battery and injury to persons can occur.

CAUTION

Be careful when you clean the infrared lens. The lens has an anti-reflective coating which is easily damaged. Damage to the infrared lens can occur.

CAUTION

Do not use too much force to clean the infrared lens. This can cause damage to the anti-reflective coating.

Note The encapsulation rating is only applicable when all the openings on the camera are sealed with their correct covers, hatches, or caps. This includes the compartments for data storage, batteries, and connectors.

3 Notice to user

3.1 Online documentation

The FLIR EST Thermal Screening documentation is continuously updated and published online.

To access the latest user manuals, product information, and other FLIR EST Thermal Screening resources, go to: http://support.flir.com/resources/est.

To access the latest FLIR Exx-EST user manual and other product information, go to: http://support.flir.com/resources/qj4c.

3.2 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*.

3.3 Accuracy

For very accurate results, we recommend that you wait 5 minutes after you have started the camera before measuring a temperature.

3.4 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.

3.5 Training

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

3.6 Important note about this manual

FLIR Systems issues generic manuals that cover several cameras within a model line.

This means that this manual may contain descriptions and explanations that do not apply to your particular camera model.

3.7 Note about authoritative versions

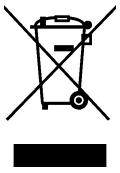
The authoritative version of this publication is English. In the event of divergences due to translation errors, the English text has precedence. Any late changes are first implemented in English.

3.8 Disposal of electronic waste

Electrical and electronic equipment (EEE) contains materials, components and substances that may be hazardous and present a risk to human health and the environment when waste electrical and electronic equipment (WEEE) is not handled correctly.

Equipment marked with the below crossed-out wheeled bin is electrical and electronic equipment. The crossed-out wheeled bin symbol indicates that waste electrical and electronic equipment should not be discarded together with unseparated household waste, but must be collected separately.

For this purpose all local authorities have established collection schemes under which residents can dispose waste electrical and electronic equipment at a recycling centre or other collection points, or WEEE will be collected directly from households. More detailed information is available from the technical administration of the relevant local authority.



4 Customer help

4.1 General

Do not hesitate to contact our Customer Support Center if you experience problems or have any questions.

For customer help, go to http://support.flir.com.

4.2 Submitting a question

To submit a question to the customer help team, you must be a registered user. It only takes a few minutes to register online. If you only want to search the knowledgebase for existing questions and answers, you do not need to be a registered user.

When you want to submit a question, make sure that you have the following information to hand:

- The camera model.
- The camera serial number.
- The communication protocol, or method, between the camera and your device (e.g., SD card reader, HDMI, Ethernet, USB, or FireWire).
- Device type (PC/Mac/iPhone/iPad/Android device, etc.).
- Version of any programs from FLIR Systems.
- Full name, publication number, and revision number of the manual.

4.3 Downloads

On the customer help site you can also download the following, when applicable for the product:

- Firmware updates for your infrared camera.
- Program updates for your PC/Mac software.
- Freeware and evaluation versions of PC/Mac software.
- User documentation for current, obsolete, and historical products.
- Mechanical drawings (in *.dxf and *.pdf format).
- CAD data models (in *.stp format).
- Application examples.
- Technical datasheets.

5 Introduction

FLIR Exx-EST is a thermal camera that can be used to screen passengers, customers, or employees for signs of elevated skin temperature.

FLIR Exx-EST has built-in FLIR EST Thermal Screening functionality. You can also connect the FLIR Exx-EST camera to the desktop software FLIR Screen-EST.

5.1 FLIR EST Thermal Screening Solutions

FLIR Systems provides different screening solutions for detection of elevated skin temperatures using thermal cameras. No thermal camera can detect or diagnose a virus or infection, but with a FLIR EST Thermal Screening Solution it is possible to identify individuals with skin temperatures that are above a specified threshold. An elevated skin temperature may indicate that the screened person has fever symptoms.

The FLIR EST systems automatically measure the surface temperature around the tear duct, analyze the measured temperature, and display a screening result. If the measured temperature is higher than the sum of a reference temperature and an allowed deviation, an alarm will trigger.

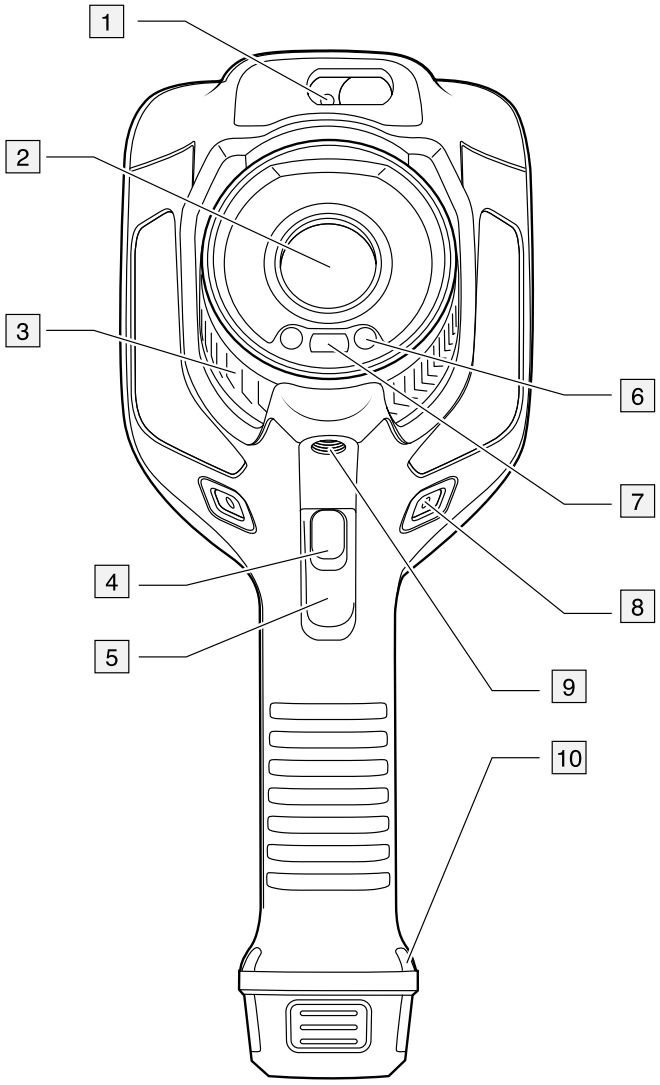
To improve the accuracy of the screening results, it is important to set up the screening station correctly.

Since the systems measure skin surface temperature, the temperatures in the FLIR EST systems are expected to be lower than 37°C (98.6°F). Note that the FLIR EST systems cannot measure core body temperature or diagnose a fever.

It is up to you to set up a suitable core body temperature measuring process, and a process for those individuals where the system has indicated an elevated skin temperature in accordance with applicable local data protection, employment, and health and safety laws.

6 Camera overview

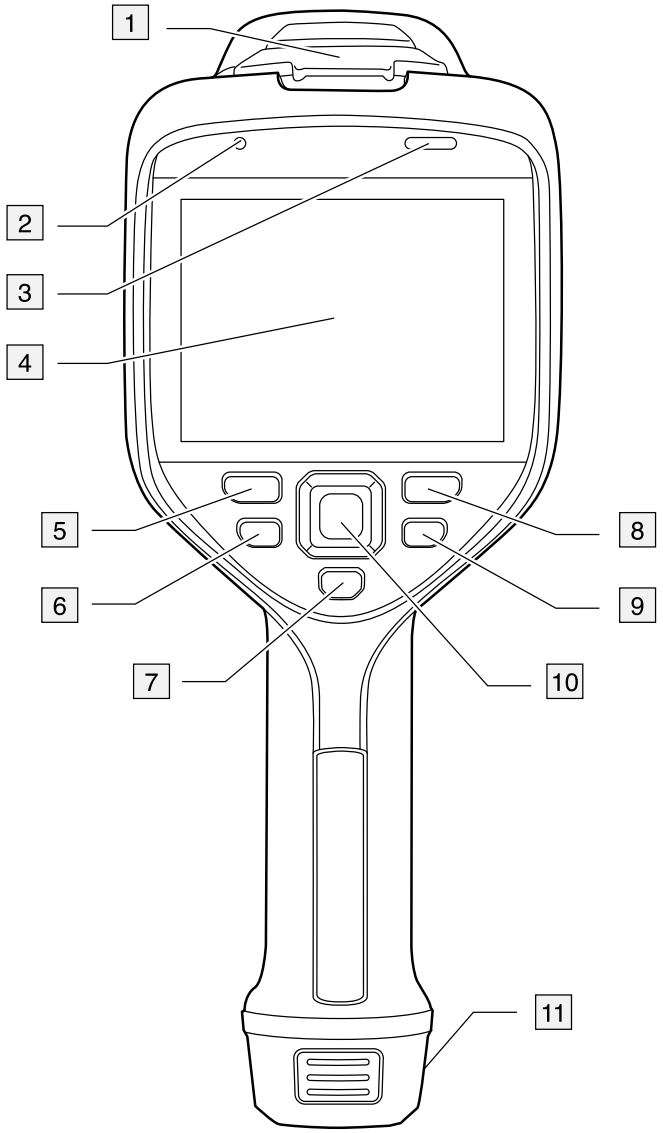
6.1 View from the front



1. Laser distance meter.[1]
2. Infrared lens.
3. Focus ring.
4. Autofocus button.[1]
5. Trigger.
6. Lamp for the digital camera (left and right sides).
7. Digital camera.
8. Attachment point for the hand strap bracket (left and right sides).
9. Tripod mount.
10. Attachment point for the hand strap, wrist strap, or lanyard strap (left and right sides).

1. This item is dependent on the camera model.

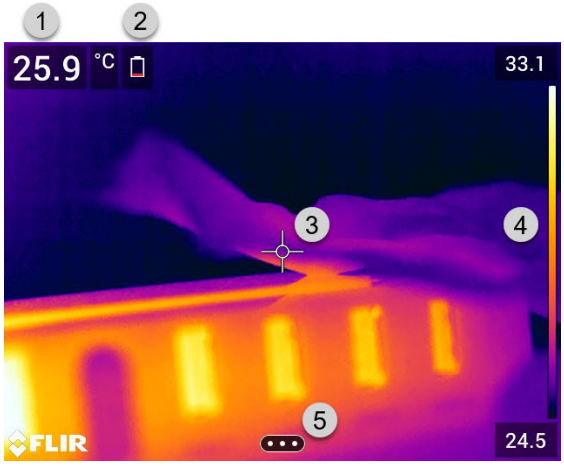
6.2 View from the rear



1. Cover for the USB connector and memory card slot.
2. Microphone.
3. Speaker.
4. Touch-screen LCD.
5. Image archive button.
6. Programmable button.
7. Button to operate the laser.
8. Back button.
9. On/off button.
10. Navigation pad with center push.
11. Battery.

6.3 Screen elements

6.3.1 General



1. Result table (applicable to measurement tools).
2. Status icons.
3. Temperature measurement tool (e.g., spotmeter).
4. Temperature scale.
5. Menu system button.

6.3.2 Menu system

To display the menu system, push the navigation pad or tap the menu system button .

The main menu includes the following:

- (*Temperature scale*)
- (*Measurement parameters*)
- (*Image mode*)
- (*Measurement*)
- (*Color*)
- (*Settings*)

6.3.3 Swipe-down menu

To open the swipe-down menu, place your finger at the top of the screen and swipe down.

The swipe-down menu includes the following:

- Battery status indicator.
- Memory card storage status indicator.
- *Wi-Fi* button.
- *Bluetooth* button.
- *Lamp* button.
- *Screen rotation* button.
- Screen brightness slider.

6.3.4 Status icons and indicators

	Battery status indicator. • When the battery status is 20–100%, the indicator is white. • When the battery is charging, the indicator is green. • When the battery status is below 20%, the indicator is red.
	The remaining storage capacity is below 100 MB.
	A Bluetooth headset is connected.
	External infrared window compensation is enabled.
	The laser is on.

6.3.5 Camera overlay

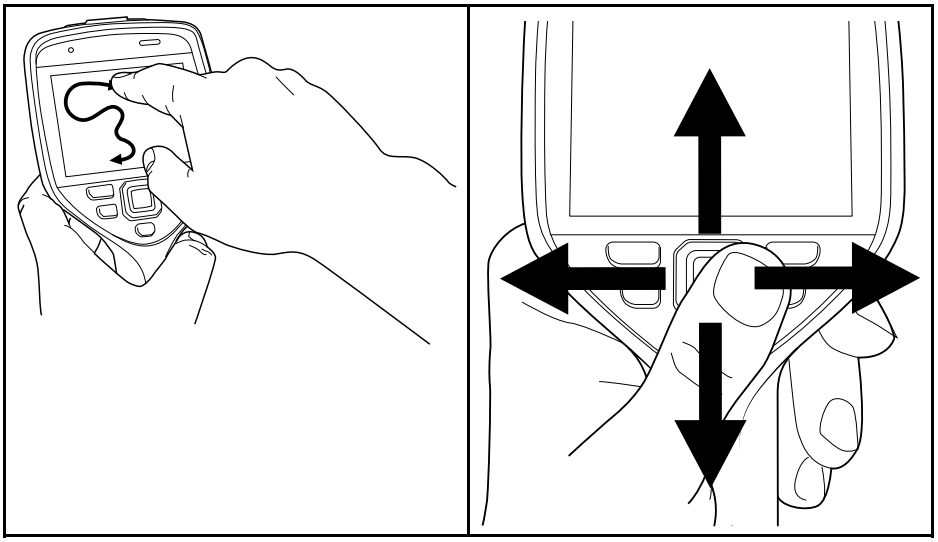
The camera overlay consists of overlay graphics and image overlay information. The overlay graphics include items such as measurement tool symbols, result tables, and status icons. The image overlay information provides additional information such as the date, emissivity, and atmospheric temperature.

The image information is activated on the *Settings* menu, see section 15.5 *Device settings*.

6.4 Navigating the menu system

You can navigate the menu system in two ways:

- Using your finger or a stylus pen specially designed for capacitive touch usage.
- Using the navigation pad and the back button .



6.4.1 Navigating using the navigation pad

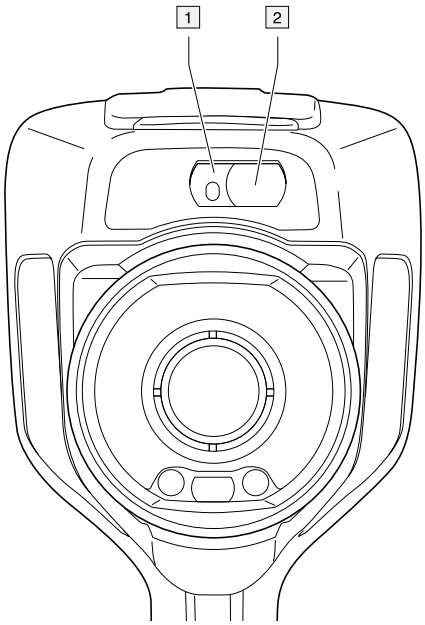
You navigate the menu system by using the navigation pad and the back button:

- To display the menu system, push the center of the navigation pad.
- To navigate in menus, submenus, 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 .

6.5 Laser distance meter and laser pointer

The laser distance meter consists of a laser transmitter and a laser receiver. The laser transmitter also works as a laser pointer.



1. Laser transmitter.
2. Laser receiver.[2]

⚠	**WARNING**
Do not look directly into the laser beam. The laser beam can cause eye irritation.	

6.5.1 Laser warning label

A laser warning label with the following information is attached to the camera:

6.5.2 Laser rules and regulations

Wavelength: 650 nm. Maximum output power: 1 mW.

This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

2. This item is dependent on the camera model.

7 Handling the camera

7.1 Charging the battery

7.1.1 General

- Before starting the camera for the first time, charge the battery for 2 hours using the stand-alone battery charger.
- Select a mains socket that is near the equipment and easily accessible.

7.1.2 Using the stand-alone battery charger to charge the battery

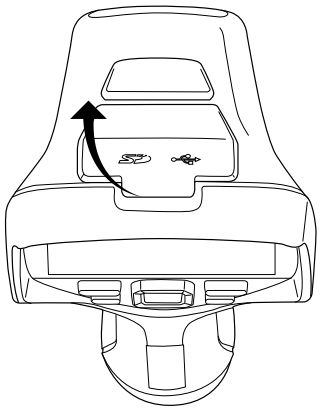
1. Put one or two batteries in the battery charger.
2. Connect the power supply cable plug to the connector on the battery charger.
3. Connect the power supply mains-electricity plug to a mains socket.
4. When the white LED on the battery charger glows continuously, the batteries are fully charged.
5. It is good practice to disconnect the stand-alone battery charger from the mains socket when the batteries are fully charged.

7.1.2.1 Stand-alone battery charger LED indicator

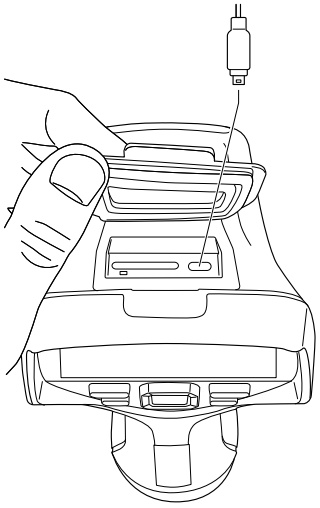
Type of signal	Explanation
The white LED flashes.	The battery is being charged.
The white LED glows continuously.	The battery is fully charged.

7.1.3 Using the USB battery charger to charge the battery

1. Put the battery into the battery compartment of the camera.
2. Connect the USB battery charger to a mains socket.
3. Fold up the rubber cover at the top of the camera.



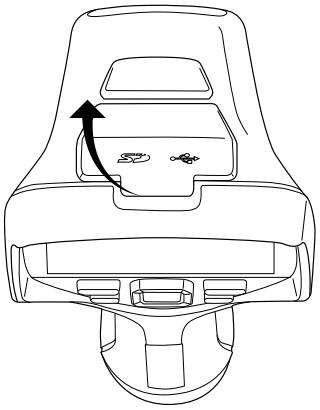
4. Connect the USB connector of the USB battery charger to the USB-C connector in the connector bay of the camera.



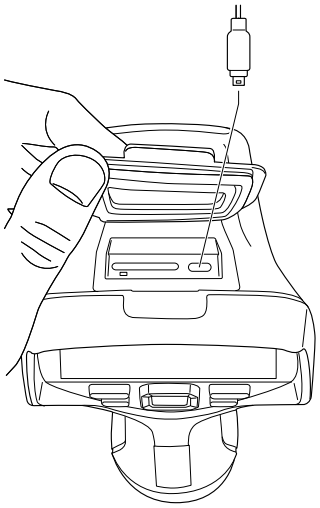
5. To check the status of the battery charging, do one of the following:
   - If the camera is turned on: Place your finger at the top of the screen and swipe down. The battery status is displayed on the swipe-down menu.
   - If the camera is turned off: The battery charging indicator is displayed on the screen.
6. It is good practice to disconnect the USB battery charger from the mains socket when the battery is fully charged.

7.1.4 Charging the battery using a USB cable connected to a computer

1. Fold up the rubber cover at the top of the camera.



2. Connect a USB cable to the USB-C connector in the connector bay. Connect the other end of the USB cable to the computer.

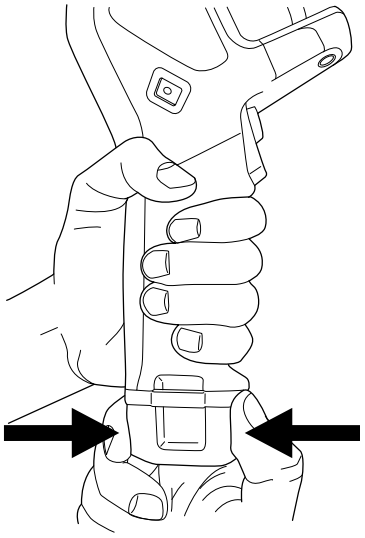


Note

- To charge the camera, the computer must be turned on.
- Charging the camera using a USB cable connected to a computer takes *considerably* longer than using the USB battery charger or the stand-alone battery charger.

7.2 Removing the battery

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



7.3 Turning on and turning off the camera

- To turn on the camera, push the on/off button ⏻.
- To turn off the camera, push and hold the on/off button ⏻ for more than 0.5 second.

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

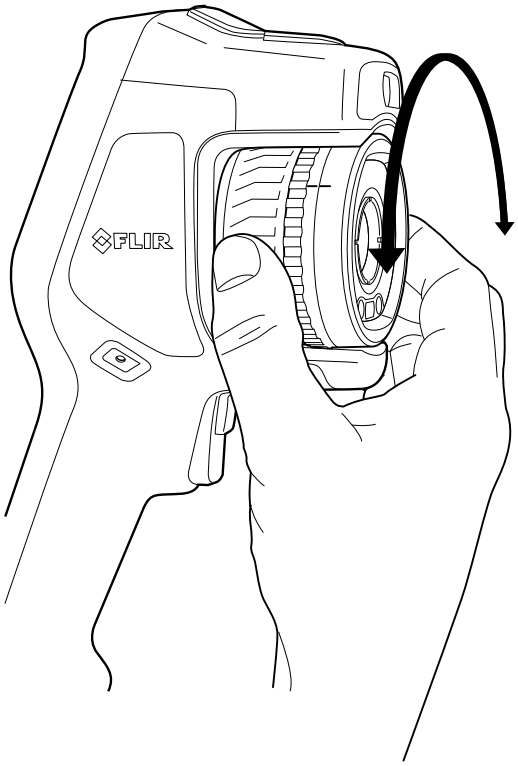
7.4 Adjusting the thermal camera focus

For accurate temperature measurements, it is very important to adjust the focus correctly.

You can adjust the camera focus by rotating the focus ring or by pushing the autofocus button. The camera can also be set up to perform continuous autofocusing.

7.4.1 Manual focus

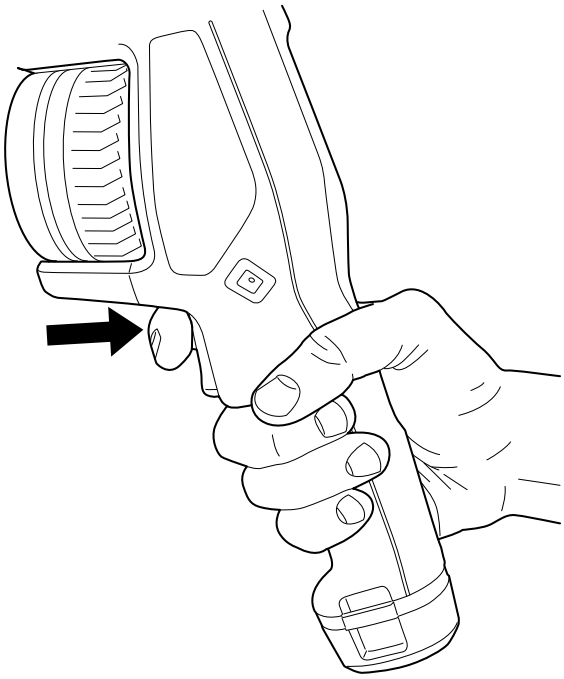
To adjust the focus manually, rotate the focus ring.



Note Do not touch the lens surface when you adjust the focus. If this happens, clean the lens according to the instructions in 7.12.2 *Infrared lens*.

7.4.2 Autofocus

To autofocus the camera, push the Autofocus button.



Note Autofocus is not supported by all camera models.

7.4.2.1 Autofocus method

When autofocusing, the camera can use one of the following focus methods:

- *Contrast*: The focus is based on maximizing the image contrast.
- *Laser*: The focus is based on a laser distance measurement. The laser is used when the camera is autofocusing.

The focus method is configured by a setting. Select (*Settings*) > *Device settings* > *Focus* > *Auto focus* and then select *Contrast* or *Laser*.

⚠ **WARNING**
When the camera is set to autofocusing with the laser method, do not point the camera at the face of a person when you use the autofocus function. The laser beam can cause eye irritation.

Note When the Screening mode is activated, the laser is automatically disabled.

7.4.3 Continuous autofocus

The camera can be set up to perform continuous autofocusing.

When the continuous autofocus function is enabled, the camera bases the focus adjustments on continuous laser distance measurements. The laser is continuously on.

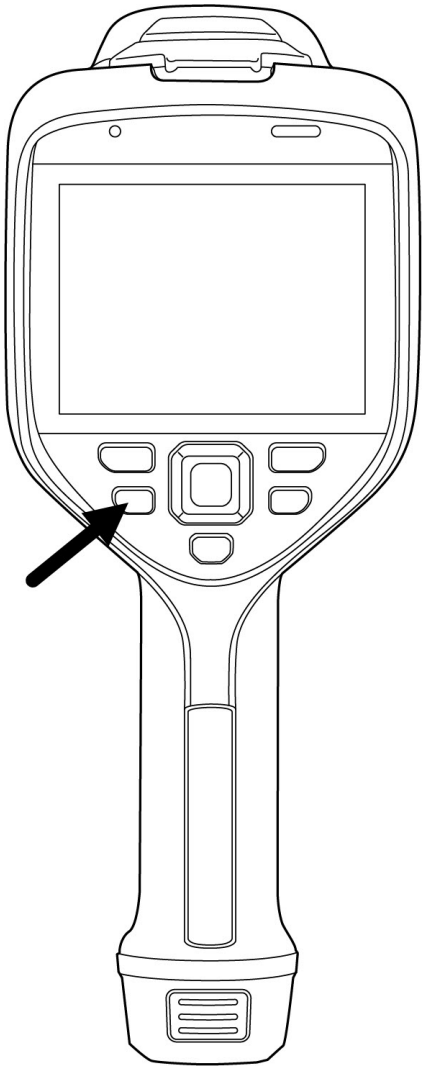
To enable or disable continuous autofocus, select (*Settings*) > *Device settings* > *Focus* > *Continuous autofocus* > *On* or *Off*.

⚠ **WARNING**
Do not point the camera at the face of a person when the continuous autofocus function is on. The camera uses laser distance measurements (that are continuous) for the focus adjustments. The laser beam can cause eye irritation.

Note

- In Screening mode, the continuous autofocus shall be disabled.
- Before you can enable continuous autofocus, you need to enable the laser and select laser as focus method. See section 7.4.2.1 *Autofocus method*.

7.5 P button



The P button is used when screening in Operator mode.

You can also assign different functions to the programmable P button, by doing the following:

1. Push and hold the P button. This displays the *Programmable button* menu.
2. Push the navigation pad up/down to select one of the functions. Push the center of the navigation pad to confirm.

7.6 Remote operation button

The Remote operation button is used to trigger the screening in Button mode. The Remote operation button can also be used as an external P button in Operator mode.

7.6.1 Pair devices

Before you can use the Remote operation button with the camera, you need to pair the devices. See section 10.3.4.1 *Pair with the button*.

7.6.2 Change the battery

To change the battery, do the following:

1. Stick the button to a flat surface.
2. Grip the silicon edges and gently screw the upper housing of the button counter clockwise. Lift the top off.
3. Replace the battery with a regular coin cell battery (CR2032).

7.7 Zooming an image

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.

To digitally zoom an image, do the following:

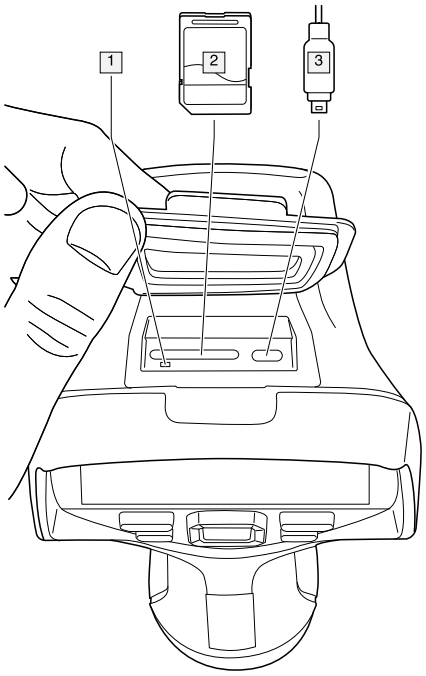
- Zoom in: Touch the screen with two fingers and spread the fingers apart.
- Zoom out: Touch the screen with two fingers and pinch the fingers together.

7.8 Connecting external devices and storage media

You can connect the following external devices and media to the camera:

- An SD memory card.
- A computer to move image and video files to and from the camera, using a USB-C to USB-A or a USB-C to USB-C cable.
- A video monitor or projector, using a USB-C to HDMI adapter.
- A USB battery charger.

Note Empty or use a memory card that has not previously been used in another type of camera. The cameras may organize files differently on the memory card. There is therefore a risk of losing data if the same memory card is used in different types of cameras.



1. LED indicator showing that the memory card is busy.

   Note

   - Do not eject the memory card when this LED is flashing.
   - Do not connect the camera to a computer when this LED is flashing.

2. SD memory card.
3. USB-C cable.

7.9 Configuring Wi-Fi

Depending on your camera configuration, you can connect the camera to a wireless local area network (WLAN) using Wi-Fi, or set up the camera as a wireless access point.

7.9.1 Connecting the camera to a WLAN

1. Select (*Settings*) > *Connections* > *Wi-Fi* > *Connect to network*.
2. Select *Available networks*. This displays a list of the available networks.
3. Select one of the available networks and push the navigation pad.

   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 *Forget network*.

Note 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.

7.9.2 Setting up a wireless access point

1. Select (*Settings*) > *Connections* > *Wi-Fi* > *Share*.
2. (Optional step.) To display and change the parameters, select *Share settings*.

   - To change the SSID, select *Network name (SSID)*.
   - To change the WPA2 password, select *Password*.

   Note These parameters are set for your camera's network. They will be used by the external device to connect that device to the network.

7.10 Pairing Bluetooth devices

You can use the camera with a Bluetooth-enabled headset.

Before you can use a Bluetooth device with the camera, you need to pair the devices.

Follow this procedure:

1. Select (*Settings*) > *Connections* > *Bluetooth*.
2. If the *Bluetooth* check box is unchecked, push the navigation pad to enable Bluetooth.

   Note You also need to ensure that the external Bluetooth device is in visible mode.

3. Select *Available devices*.
4. Wait until a list of available devices is displayed. This will take about 15 seconds.
5. When a Bluetooth device is found, select the device to add it, and begin the pairing procedure. The device is then ready to be used.

7.11 Operating the laser

The laser distance meter consists of a laser transmitter and a laser receiver. The laser distance meter determines the distance to a target by measuring the time it takes for a laser pulse to reach the target and return to the laser receiver. This time is converted to a distance, which is displayed on the screen.

The laser transmitter also works as a laser pointer. When the laser is on, you will see a laser dot approximately at the target.

To operate the laser, do the following:

1. Enable the laser by selecting (*Settings*) > *Device settings* > *Lamp & laser* > *Enable lamp & laser*.
2. To turn on the laser, push and hold the laser button. The distance to the target is displayed on the screen.
3. To turn off the laser, release the laser button.

WARNING

Do not look directly into the laser beam. The laser beam can cause eye irritation.

7.12 Cleaning the camera

7.12.1 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.

7.12.2 Infrared lens

Use one of these liquids:

- A commercial lens cleaning liquid with more than 30% isopropyl alcohol.
- 96% ethyl alcohol (C_2H_5OH).

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.

7.12.3 Infrared detector

Even small amounts of dust on the infrared detector can result in major blemishes in the image. To remove any dust from the detector, follow the procedure below.

Note

- This section only applies to cameras where removing the lens exposes the infrared detector.
- In some cases the dust cannot be removed by following this procedure: the infrared detector must be cleaned mechanically. This mechanical cleaning must be carried out by an authorized service partner.

CAUTION

In Step 2 below, do not use pressurized air from pneumatic air circuits in a workshop, etc., as this air usually contains oil mist to lubricate pneumatic tools.

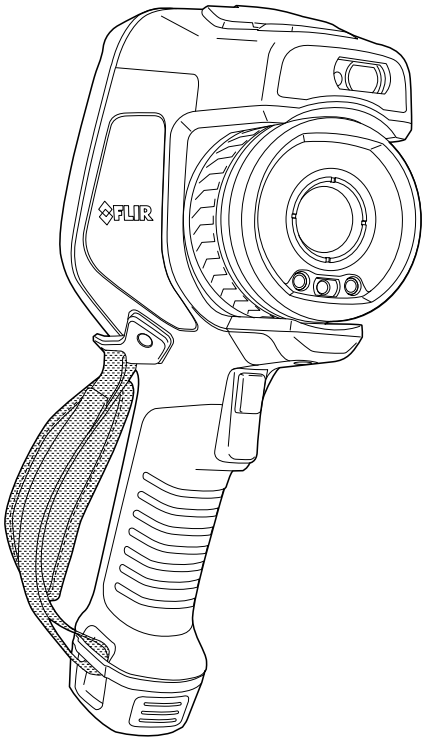
Follow this procedure:

1. Remove the lens from the camera.
2. Use pressurized air from a compressed air canister to blow off the dust.

7.13 Hand strap

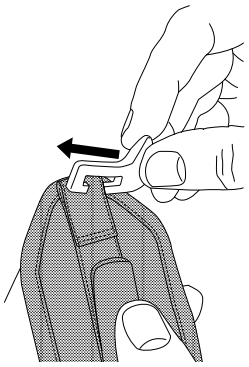
The upper part of the hand strap is attached to the camera by a bracket. There is one bracket for the left side and one for the right side of the camera.

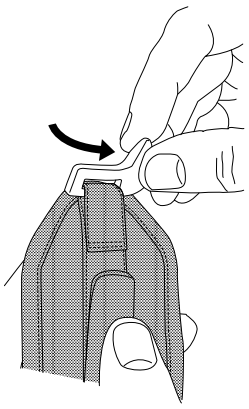
The lower part of the hand strap is threaded through the attachment point at the base of the camera.



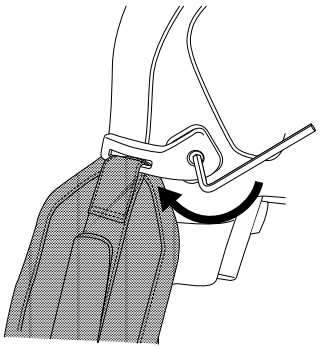
7.13.1 Mounting the hand strap

1. Fit the upper part of the hand strap into the bracket.

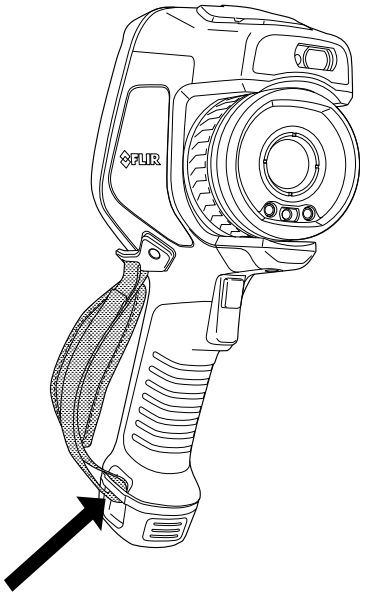




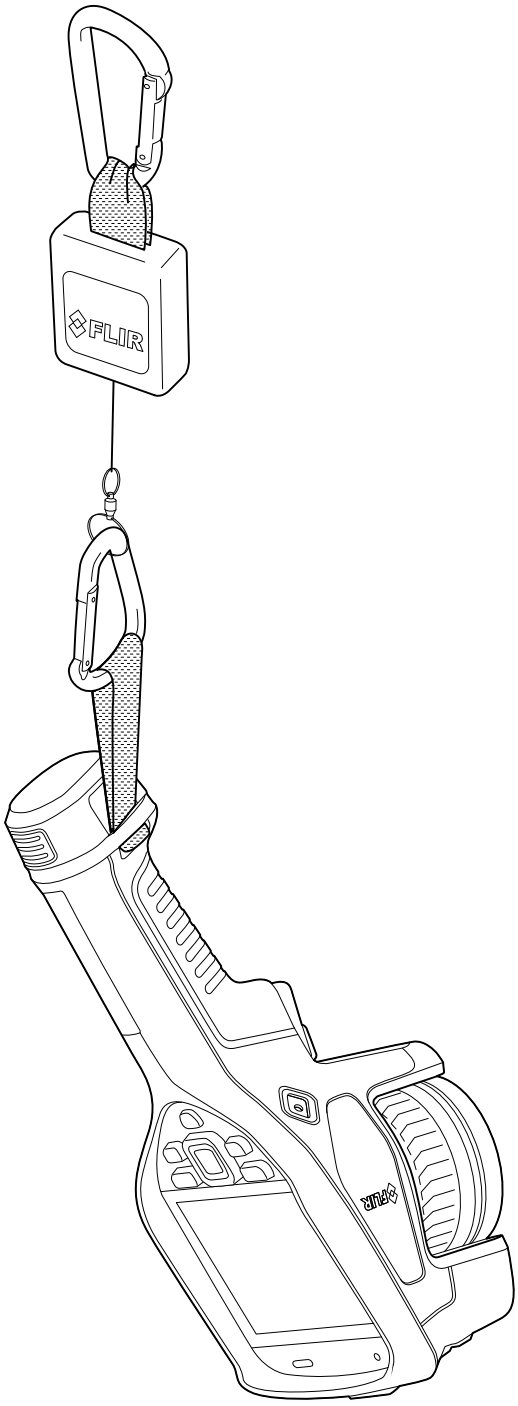
2. Fit the bracket in place on the camera and tighten the screw with the supplied Torx key.



3. Thread the loose strap through the attachment point at the base of the camera. Secure the strap with the hook-and-loop fastener.



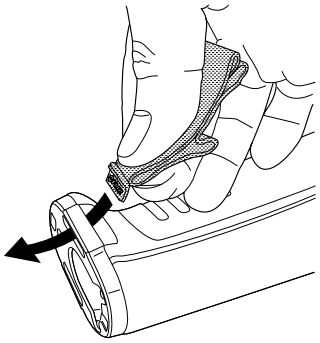
7.14 Lanyard strap



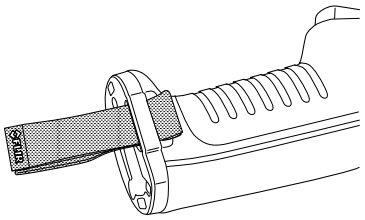
To mount the lanyard strap, do the following:

1. Remove the camera battery.

2. Starting with the FLIR logo part, thread the lanyard strap through the attachment point at the base of the camera.

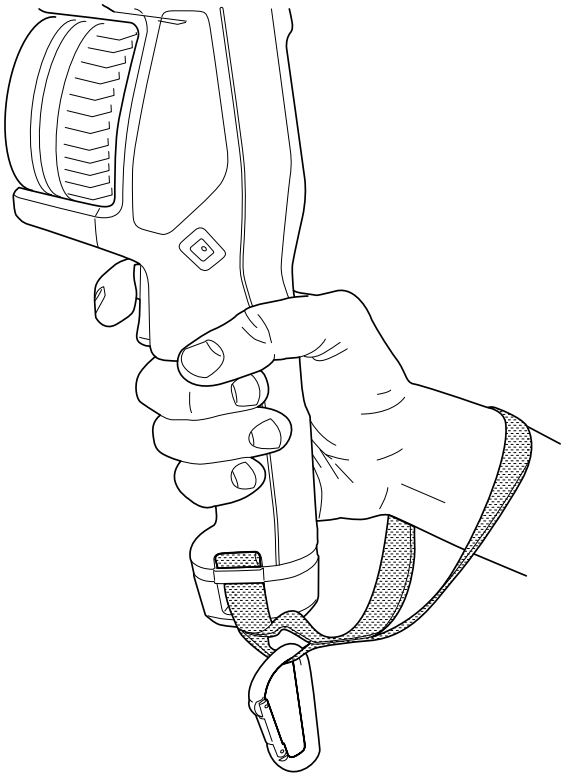


3. Pull the entire lanyard strap through the attachment point until it stops.



7.15 Wrist strap

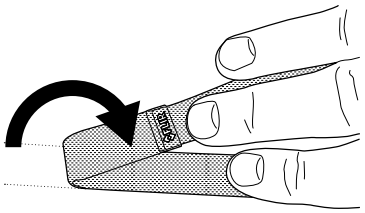
The wrist strap can also be used to attach a carabiner to the camera.



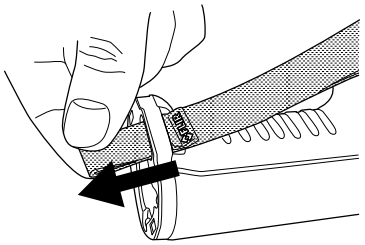
To mount the wrist strap, do the following:

1. Remove the camera battery.

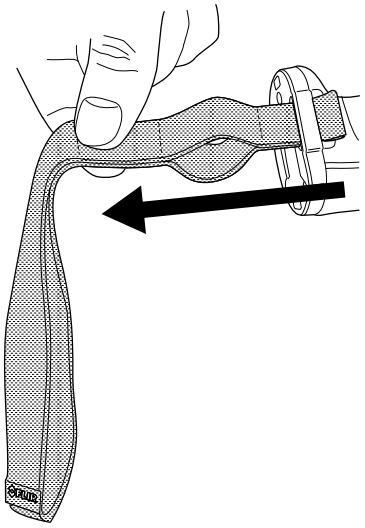
2. Fold the wrist strap. Make sure that the part with the FLIR logo faces away from the bend.



3. Thread the bent wrist strap through the attachment point at the base of the camera.

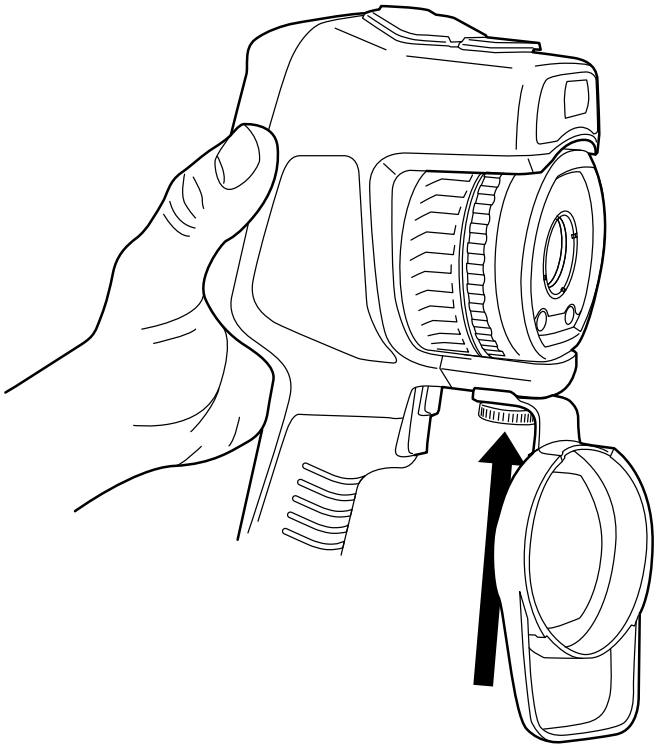


4. Pull the entire wrist strap through the attachment point until it stops.



7.16 Front protection

To protect the camera lens and the laser distance meter, you can attach the front protection by using the supplied fastening device.



7.17 Changing camera lenses

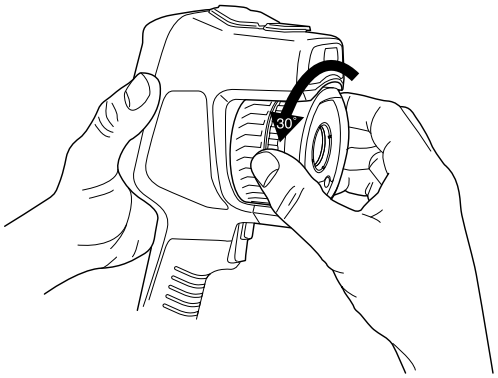
Applicability: Camera models with an exchangeable lens.

Note If the new lens has not been used with the camera before, the lens–camera combination must be calibrated after the lens has been mounted. See section 7.18 *Calibrating the lens–camera combination* for information on how to do this.

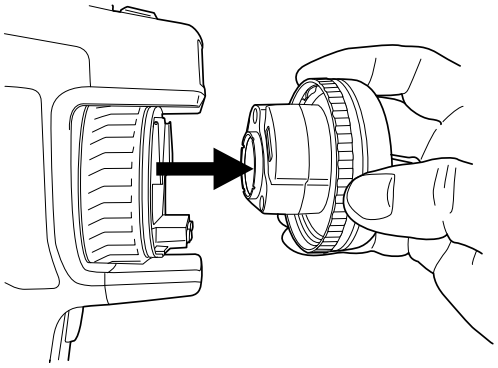
Note Do not touch the lens surface when you change lenses. If this happens, clean the lens according to the instructions in 7.12.2 *Infrared lens*.

Follow this procedure:

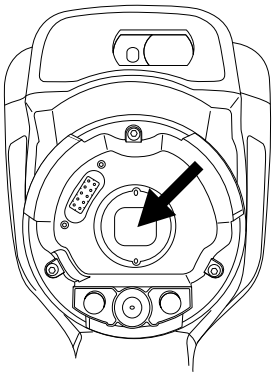
1. Take a firm grip around the inner ring of the lens. Rotate the inner ring 30° counterclockwise until it stops.



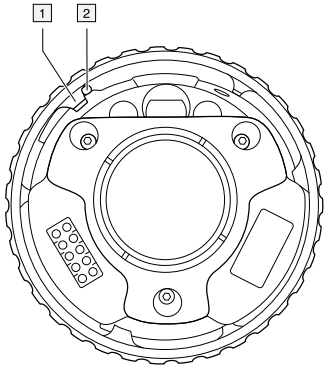
2. Carefully pull out the lens.



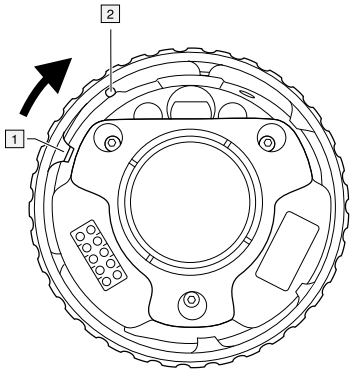
3. The infrared detector is now fully exposed. Do not touch this surface. If you see dust on the detector, follow the instructions in 7.12.3 *Infrared detector*.



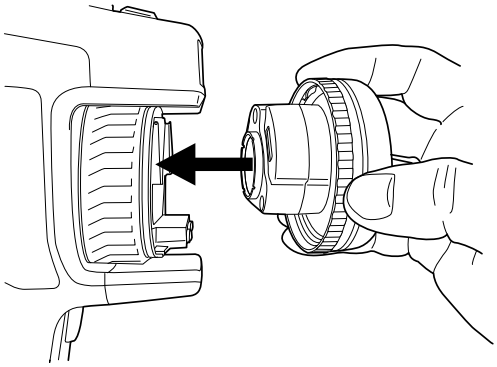
4. Make sure that the inner ring of the camera lens is fully in its open position.
   - Correct: The tooth (1) is in its end position at the black stop pin (2).



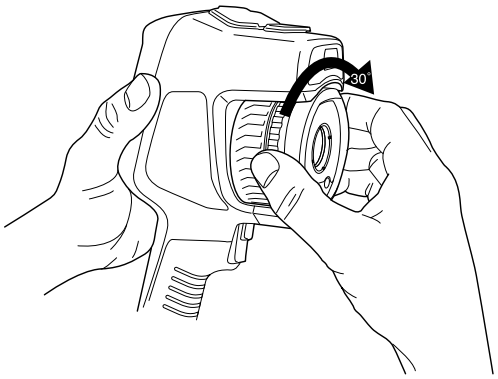
   - Wrong: You must rotate the inner ring until the tooth (1) reaches the black stop pin (2).



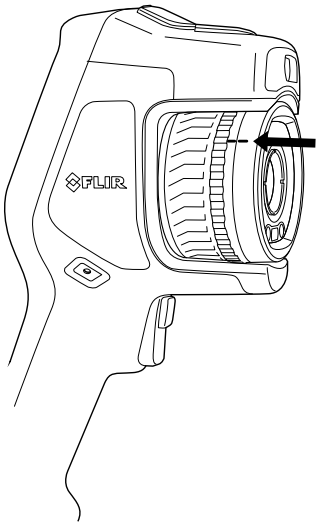
5. Carefully push the lens into position.



6. Rotate the inner ring of the lens 30° clockwise. The lens makes a click when it locks in place.



7. Make sure that the two index marks are aligned, indicating that the lens is locked in place.



7.18 Calibrating the lens–camera combination

Applicability: Camera models with an exchangeable lens.

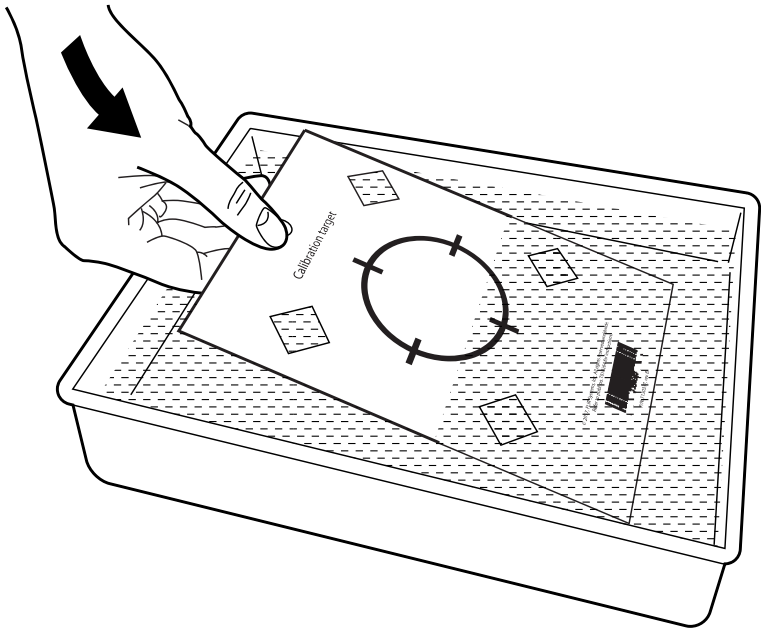
7.18.1 Introduction

Before a new lens can be used with the camera, the lens–camera combination must be *calibrated*.

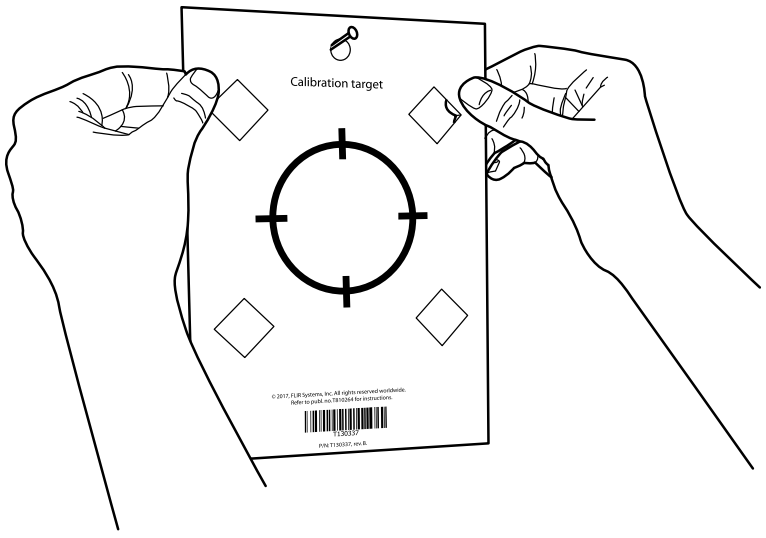
This is a process that previously had to be performed by a FLIR service department, but for the FLIR Exx-EST series the calibration can be performed by the user. This feature is called AutoCal. The AutoCal procedure requires a calibration target, which is included in the lens package.

7.18.2 AutoCal procedure

1. Dip the calibration target in water for 1 second and let the excess drip off.



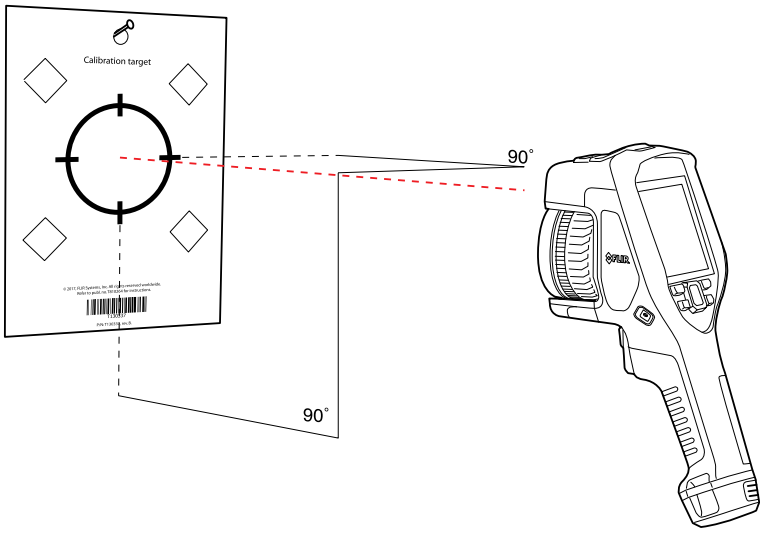
2. Tape or hang the calibration target on a wall.



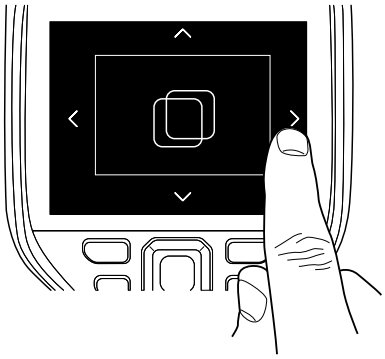
3. Mount the new lens on the camera according to the procedure in section 7.17 *Changing camera lenses*. When the lens is mounted, the calibration wizard starts automatically.

4. From a distance of 2 m (6.6 ft.), aim the camera toward the crosshair, using the laser pointer. The camera will take a picture automatically.

   Note Make sure the camera's optical path is perpendicular to the calibration target. See the image below.



5. In the camera, align the thermal and visual images (indicated by the two squares in the image below), using the touchscreen arrows. The lens–camera combination is now calibrated.



To repeat the procedure at a later time, go to *Settings* > *Camera information* > *Calibrate lens...*.

7.19 Calibrating the compass

It is recommended that the compass is calibrated every time you move the camera to a new location.

Follow this procedure:

1. Push the navigation pad to display the menu system.
2. Select (*Settings*) and push the navigation pad. This displays the *Settings* menu.
3. Use the navigation pad to select *Device settings* > *Geolocation* > *Compass*.
4. If the *Compass* check box is unchecked, push the navigation pad to enable the compass.
5. Select *Calibrate compass* and push the navigation pad. Follow the on-screen instructions.

   Note You must rotate the camera slowly.

8 Overview — Screening camera modes

FLIR Exx-EST has three built-in FLIR EST Screening modes:

- Auto mode
- Button mode
- Operator mode

In Screening mode, the camera measures the surface temperature around the tear duct. An alarm will trigger if the measured temperature is higher than the sum of a reference temperature average and an allowed deviation.

The reference temperature average is calculated based on measurement samples registered by the camera. The allowed deviation can be specified by a setting.

Note

- When in screening mode, no images are saved by the camera.
- The camera only stores the temperature values of some measurements used for the calculation of the reference temperature. It is impossible to connect these values to any individual.

8.1 Auto mode

Auto mode is intended for screening at a screening station. The screening is fully automated and no operator interaction is normally required, except for initiation of the system.

The camera detects when someone stands in front of the screening station and then shows live video on the display. The display graphics guide the person into the correct position for the screening. When the person is in a good position, the camera measures the temperature of the hottest spot within a measurement box, evaluates the measurement, and displays a result.

8.2 Button mode

Button mode is intended for screening at a screening station. An operator is required to initiate the system and during the screening process.

In Button mode, the screened person stands in front of the camera, looking at a display. When the person is in a good position for screening, the operator presses a Bluetooth button to trigger the screening. The camera detects and measures the temperature of the hottest spot within a measurement box, evaluates the measurement, and displays a result.

8.3 Operator mode

In Operator mode, an operator actively screens people when they are in the correct position.

Before the screening, the operator must record reference samples. To keep the reference temperature up to date, the operator must also periodically record new samples.

8.4 Working principle (Auto and Button mode)

8.4.1 Moving average

The camera uses a relative temperature screening method, with a moving average as reference. The moving average is calculated based on temperature measurement samples, which are registered automatically.

During the screening procedure, the camera compares the measured temperature with the sum of the moving average and a configurable allowed deviation. The elevated

temperature alarm will trigger if the measured temperature is above the alarm limit. The alarm limit is the sum of the moving average and the allowed deviation.

8.4.2 Max/min temperature range

If the spread of values in a data set is large, the average will be difficult to use for evaluation of individual values. For that reason, the screening algorithm will only work with temperatures that are within a certain temperature range. If the measured temperature is outside this range, the camera will display a “Too cold/warm” message.

For example, a person arriving to the office by bike will be cold in the face and may get a “Too cold” message even if the outdoor temperature is at room level. For an efficient screening flow, it is recommended to allow persons to stabilize their temperature before they are screened. Thanks to a high blood flow, the skin around the tear duct adapts to the ambient temperature within a few minutes.

The temperature range is defined by a maximum and minimum temperature limit, which is possible to change by settings. It is recommended to use the default values. The settings should only be changed if you experience problems and understand the consequences.

In a situation where all visitors come directly from a cold outdoor environment, without possibility to adapt to the indoor temperature, the screening flow may be disturbed by many “Too cold” messages. By changing the minimum temperature setting to a lower value, there will be fewer “Too cold” messages.

If you have visitors that come both from a cold outdoor environment and a warm indoor environment, you need to be careful about changing the minimum temperature setting. Persons coming from a cold outdoor environment will have a lower skin temperature, regardless of their body temperature.

If people coming directly from a cold environment are not stopped by a “Too cold” message, they may not have time to adapt their temperature to the indoor temperature before the screening algorithm performs the evaluation. This means there is a risk that people with an elevated temperature pass the screening, since the skin temperature of their cold faces may be below the alarm limit.

If people coming directly from a cold environment are allowed to adapt their temperature to the indoor temperature before the evaluation, only persons with a normal temperature will pass the screening and there will be a screening alarm for persons with an elevated temperature.

9 Getting started

The FLIR Exx-EST camera can be used to screen passengers, customers, or employees for signs of elevated skin temperature.

Screening with the FLIR Exx-EST can be performed in different ways:

- Using one of the built-in Screening modes; Auto, Button, or Operator mode. For more information, see section 8 *Overview — Screening camera modes*.
- Using the camera in combination with the desktop software FLIR Screen-EST. For more information, refer to the FLIR EST Thermal Screening documentation, see section 3.1 *Online documentation*.

For accurate and efficient screening, it is important to set up and operate the screening station correctly. The setup and operation depends on the FLIR EST solution (Auto, Button, or Operator mode, or FLIR Screen-EST) you choose to use.

9.1 Auto and Button mode screening

9.1.1 Set up the screening station

The setup procedure includes the following main steps:

1. Plan and prepare the screening station.
2. Prepare the camera.
3. Prepare the button (Button mode).
4. Place the camera and display.
5. Define the screening position.
6. Adjust the angle of the camera.
7. Test the setup.
8. Place the queueing system and supporting materials.
9. Clearly mark the screening position.
10. Mark the positions of all equipment.

For detailed instructions, see chapter 10 *Setup — Screening station (Auto and Button mode)*.

9.1.2 Operate the screening station

The operation of the screening station includes the following operator tasks:

1. Prepare the system for a new screening session.
2. Auto mode: The screening normally does not require any action from the operator. Depending on the company specific workflow, the operator may need to be available for guidance and alarms.
3. Button mode: During the screening, you guide the visitors to a good screening and trigger the screening by pressing a Bluetooth button.

For detailed instructions, see chapter 12 *Operation — Operator instructions (Auto and Button mode)*.

9.2 Operator mode screening

In Operator mode, an operator actively screens people when they are in the correct position. Before the screening, the operator must record reference samples.

For detailed instructions, see chapter 13 *Operator mode screening*.

9.3 FLIR Screen-EST screening station

For detailed instructions on how to setup, configure, and operate a screening station with FLIR Exx-EST and the FLIR Screen-EST application, refer to the FLIR EST Thermal Screening documentation, see section 3.1 *Online documentation*.

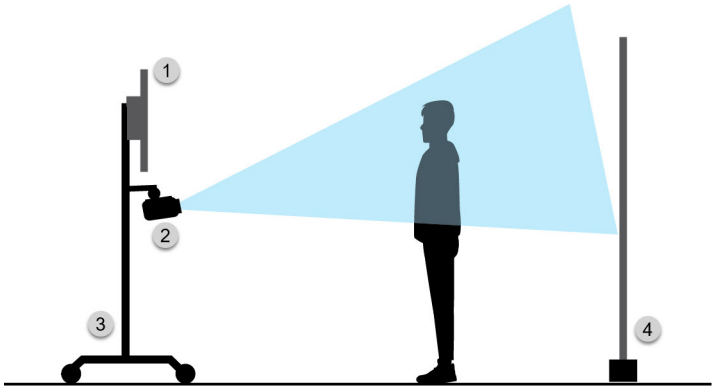
10 Setup — Screening station (Auto and Button mode)

This chapter describes how to set up a screening station for Auto mode or Button mode screening.

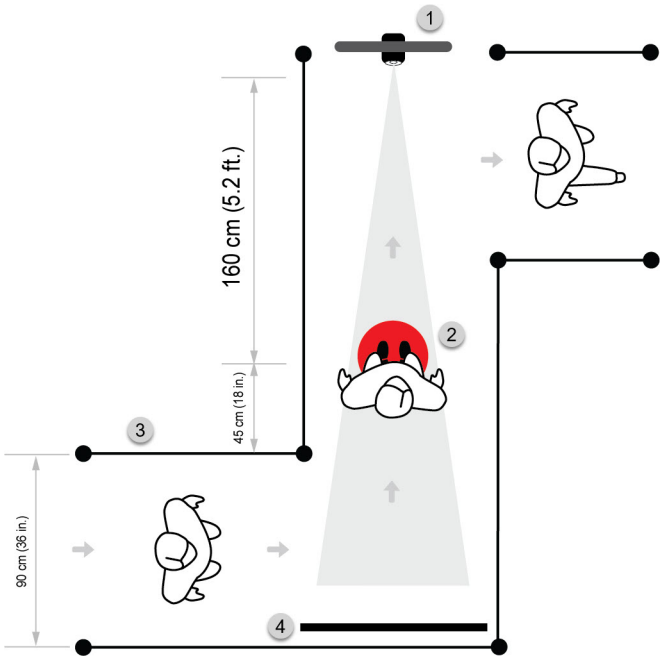
- For accurate and efficient screening, it is recommended to set up the screening station as outlined in section 10.1 *Screening station setup*.
- For step-by-step instructions, see section 10.3 *Step-by-step setup instructions*.

10.1 Screening station setup

The figures below show a typical screening station setup. For more information, see chapter 11 *Description — Screening station (Auto and Button mode)*.



1. Visitor display.
2. Thermal camera.
3. Stand.
4. Optional: Backdrop.



1. Stand with thermal camera and visitor display.

2. Screening position.
   It is important to clearly mark the screening position (where the person should stand for the screening). The distance from the camera lens to the center of the screening position shall be 160 cm (5.2 ft.).
3. Queueing system, e.g. barriers and arrow floor stickers.
   The queueing system will guide the visitors into the screening station, to the correct screening position, and out of the screening station. A recommended standard is to keep the queue at least 90 cm (36 in.) wide. To make sure people do not cut the corner and end up too close to the camera, about 45 cm (18 in.) should be added to the barrier leading in to the screening station.
4. Optional: Backdrop.
   A backdrop may be needed to prevent background disturbances from reaching the camera, such as passing or queueing people.

Additional, not in the figure:

- Bluetooth button (Remote operation button).
  Used in Button mode to trigger the screening.
- Optional: Operator display.
  Secondary display placed near the operator for monitoring.
- Optional: Information roll-up.
  Roll-up that informs people what the screening is about and why they need to do it.
- Optional: Instruction roll-up.
  Roll-up that tells people to remove eyeglasses before they are screened.

  Note Removing eyeglasses is crucial for a correct screening result.

10.2 Equipment, materials, and tools

This chapter describes the equipment and material needed to set up a screening station for Auto or Button mode screening.

10.2.1 Camera accessories

The following accessories, included in the camera package, are needed:

- USB Type-C to USB Type-C cable
- HDMI adapter (USB Type-C to HDMI and PD adapter)
- Power adapter (Power supply, 15 W/3 A)
- Remote operation button (needed for Button mode)

10.2.2 Display

The following display equipment is needed:

- Visitor display.
- HDMI cable.
- Power cable.
- Optional: Operator display.
- Optional: HDMI splitter for connection of two displays.

10.2.3 Equipment and supporting material

The following equipment and supporting material are needed:

- Mounting equipment for display and camera; e.g. stand, wall mount, tripod, bar table.
- Marker to indicate the screening position; e.g. floor sticker.
- Queueing system; e.g. barriers, arrow stickers.
- Optional: Backdrop, preventing background disturbances.
- Optional: Information materials; e.g. roll-ups.

Note For available roll-ups and other supporting materials from FLIR Systems, go to https://www.flir.com/.

Figure 10.1 Screening position floor sticker

Figure 10.2 Backdrop

10.2.4 Materials and tools

The following materials and tools can be useful:

- Measuring tape or yardstick.
- Screwdriver.
- Masking tape.
- Cable ties.
- Extension cords.
- Cable covers (to prevent people from stumbling over the cables).

10.3 Step-by-step setup instructions

Before starting the setup, please read the instructions for the entire setup procedure.

Make sure you have all the needed equipment and material, see section 10.2 *Equipment, materials, and tools*.

Note The setup as described in this section is adapted for persons with an average height of 170 cm (5.6 ft.). With this setup, the system will screen persons with a height of 150-195 cm (4.9–6.4 ft.). To adapt the setup for other average heights, see section 10.4 *Height of screened persons*.

10.3.1 Main steps

The setup procedure includes the following main steps:

1. Plan and prepare the screening station.
2. Prepare the camera.
3. Prepare the button (Button mode).
4. Place the camera and display.
5. Define the screening position.
6. Adjust the angle of the camera.
7. Test the setup.
8. Place the queueing system and supporting materials.
9. Clearly mark the screening position.
10. Mark the positions of all equipment.

10.3.2 Plan and prepare the screening station

Before you set up the screening station, you need to do some planning. Where will you conduct the screening? How should the visitors flow into the screening station and out? Who will be the operator? What should happen in case of a screening alarm?

- For factors to consider related to the area around the screening station, see section 11.3 *Screening station considerations*.
- For factors to consider related to the policies of your company, see section 11.4 *Company policies*.

10.3.3 Prepare the camera

Note Prepare the camera before you mount it. It can be difficult to do the necessary settings when the camera is mounted.

10.3.3.1 New camera

If you have a new camera, do the following:

1. Charge the battery for 2 hours using the stand-alone battery charger.
2. Push the battery into the battery compartment. The battery makes a click when it locks in place.

10.3.3.2 Turn on the camera

- To turn on the camera, push the on/off button .
- To turn off the camera, push and hold the on/off button for more than 0.5 second.

10.3.3.3 Configure the camera

For accurate screening results, some important settings are needed in the camera.

You access the camera settings via the menu system.

- To display the menu system, push the navigation pad or tap the menu system button .
- To navigate the menu system, you can use the navigation pad or tap the camera screen.

To configure the camera, do the following:

1. Make sure automatic image adjustment mode is active by selecting (*Temperature scale*) and then (*Auto*).
2. Disable continuous autofocus by selecting (*Settings*) > *Device settings* > *Focus* > *Continuous autofocus* > *Off*.

Note When the Screening mode is activated, some more important settings are automatically made. For example, since the laser beam can cause eye irritation, the laser is automatically disabled.

10.3.3.4 Activate and configure Screening mode

1. Activate the screening mode by selecting (*Settings*) > *Recording mode* > *Screening*.
2. In the *Screening* dialog box, do the following:
   - Select the option *Auto* or *Button*.
   - Select if there should be a beep or no sound when the system detects an elevated temperature.
   - Select the allowed deviation from the reference average. It is recommended to start with the default value 1.0°C/1.8 °F.

10.3.4 Prepare the button

For Button mode screening, the Remote operation button is needed to trigger the screening.

10.3.4.1 Pair with the button

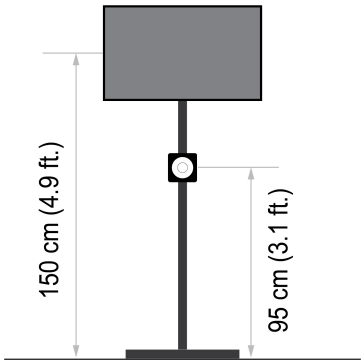
Before you can use the Remote operation button with the camera, you need to pair the devices.

1. Press the Remote operation button to wake it up. The button flashes a couple of times.
2. In the camera, select (*Settings*) > *Connections* > *Bluetooth*.
3. Select the *Bluetooth* check box to enable Bluetooth.
4. Select *Available devices* to start a scan for devices.
5. Wait until a list of available devices is displayed.
6. Select the button in the list to start the pairing procedure.
7. When the pairing is completed, the button is ready to be used with the camera.

Note Do not pair the Remote operation button with any other device than a FLIR camera. If you do that, it will no longer be possible to pair the button with a FLIR camera.

10.3.5 Place the camera and display

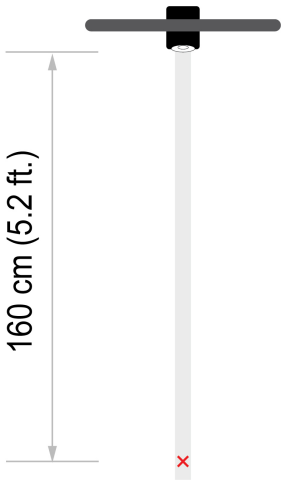
1. Mount the visitor display and camera.
   - The distance from the floor to the center of the display shall be 150 cm (4.9 ft.).
   - The camera shall be placed under the display and vertically aligned with the display.
   - The distance from the floor to the camera lens shall be 95 cm (3.1 ft.).



2. Connect the camera and display(s).
   2.1. Connect the display(s).
      - Visitor display: Connect the display to the HDMI adapter.
      - Visitor and operator displays: Connect the displays to the HDMI splitter.

   2.2. Open the cover at the top of the camera. Connect the USB Type-C cable from the camera to the HDMI adapter/splitter.
   2.3. Connect the HDMI adapter/splitter to the power adapter. Connect the power adapter to a power outlet.
   2.4. Change the display settings so it never enters sleep mode.
3. Remove the lens cover from the camera.
4. Turn on the camera and make sure the camera image is visible on the display(s).
5. Applicable to Button mode: Place the Remote operation button so that the operator can view the screening station and trigger the screening.

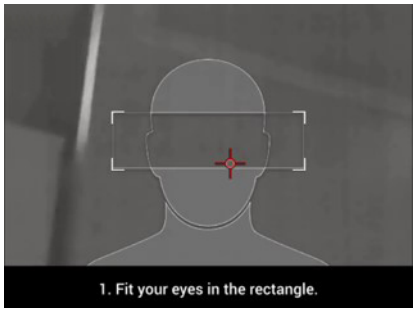
10.3.6 Define the screening position



1. Make a straight line from the camera towards the screening position - use a masking tape.
2. Make a mark on the tape at 160 cm (5.2 ft.) from the camera lens, indicating the screening position.

10.3.7 Adjust the angle of the camera

1. Place a 170 cm (5.6 ft.) tall person at the screening position.
2. Tilt the camera so that it aims at the face of the person.
3. Look at the image on the display and adjust the angle of the camera until the eyes of the person are inside the box.



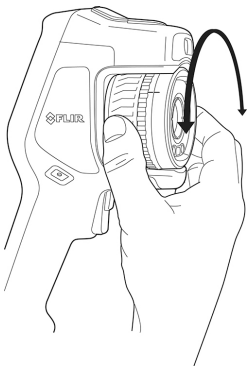
10.3.8 Test the setup (Auto mode)

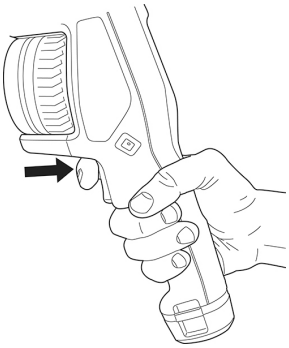
To test the setup for Auto mode screening, do the following:

1. Enter initiation mode by first selecting another Recording mode and then selecting the Screening mode again.

   To change the Recording mode, select (*Settings*) > *Recording mode*.
2. In the *Screening* dialog box, select *Auto*.
3. The camera must first record an initial sample for the reference temperature calculation.
   Place a person at the marking on the tape that indicates the screening position. The camera graphics may indicate that the person needs to move closer to the camera, which is OK to do.
4. Make sure the person looks into the camera and stands still until a screening result is displayed.
5. Check that the camera focus is correct and that the measurement was done at the tear duct. If not, deactivate and activate the Screening mode again and restart the initiation.

6. Wait for two minutes. Make sure there is no people or movement in front of the camera. During this time, the camera adapts to the ambient temperature.
7. Place a person at the marking for the screening position (not closer or further away from the camera).
8. Check that:
   - A screening result is displayed with the person standing at the screening position (not closer).
   - The measurement was done at the tear duct. If not, deactivate and activate the Screening mode again and restart the initiation.
   - The camera focus is correct. If not, adjust the focus by rotating the focus ring or by pushing the autofocus button.





9. Place persons of different heights at the marking for the screening position (not closer or further away from the camera).
   Look at the image on the display and check that it is possible for the person to get the eyes inside the box.
   - Tall persons may have to bend their knees.
   - Short persons may need e.g. a high chair to sit on.

10.3.9 Test the setup (Button mode)

To test the setup for Button mode screening, do the following:

1. Enter initiation mode by first selecting another Recording mode and then selecting the Screening mode again.

   To change the Recording mode, select (*Settings*) > *Recording mode*.
2. In the *Screening* dialog box, select *Button*.
3. Place a person at the marking on the tape that indicates the screening position. Make sure the person looks into the camera and stands still until the initiation is completed and a screening result is displayed.

   Note It is important that the person stands at the marking for the screening position (not closer or further away from the camera).
4. Press the Remote operation button. This starts the initiation.
5. During the initiation, the camera automatically adjusts the focus and resets the reference temperature average.
6. When the initiation is completed, check that the camera focus is correct and that the measurement was done at the tear duct.
   If the camera is out of focus or the measurement was not done at the tear duct, deactivate and activate the Screening mode again and repeat the initiation.

7. Place persons of different heights at the marking for the screening position (not closer or further away from the camera).
   Look at the image on the display and check that it is possible for the person to get the eyes inside the box.
   - Tall persons may have to bend their knees.
   - Short persons may need e.g. a high chair to sit on.

10.3.10 Place the queueing system and supporting materials

Queueing system.

1. Place the barriers that will guide the persons through the screening station.
2. Place the arrow stickers.

   Note You may want to start with temporary markings and wait with the arrow stickers until you have tested the screening station for a few days.

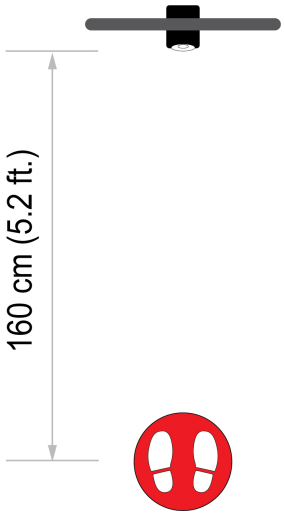
Optional: Backdrop.

1. Place the backdrop behind the screening position.
2. Look at the live image on the display and make sure the camera only sees the backdrop.

Optional: Information materials.

1. Place the information roll-up
2. Place the instruction roll-up

10.3.11 Clearly mark the screening position



Note You may want to start with a temporary marking and wait with the permanent floor sticker until you have tested the screening station for a few days.

1. Clearly mark the screening position, e.g. by a floor sticker.
   The distance from the camera lens to the screening position shall be 160 cm (5.2 ft.).
2. Remove the masking tape.

10.3.12 Mark the positions of all equipment

Mark the positions of any movable equipment (e.g. stand with camera and display, backdrop, barrier poles) e.g. by tape on the floor. This to ensure that everything is put back in the right place after e.g. cleaning of the floor.

Note You may want wait with the permanent markings until you have tested the screening station for a few days.

10.4 Height of screened persons

The screening station setup is adapted for persons with an average height of 170 cm (5.6 ft.). With this setup, the system will screen persons with a height of 150-195 cm (4.9–6.4 ft.).

- Very short persons may need e.g. a high chair to sit on.
- Very tall persons may have to bend their knees.

To adapt the screening station for a shorter or taller average height, lower or raise both the display and the camera. The distance from the center of the display to the camera lens shall still be 150–95=55 cm (4.9–3.1=1.8 ft.).

11 Description — Screening station (Auto and Button mode)

This chapter describes a screening station for Auto mode or Button mode screening.

11.1 Overview

The screening station consists of a FLIR Exx-EST thermal camera, a clearly defined screening position, and a queueing system.

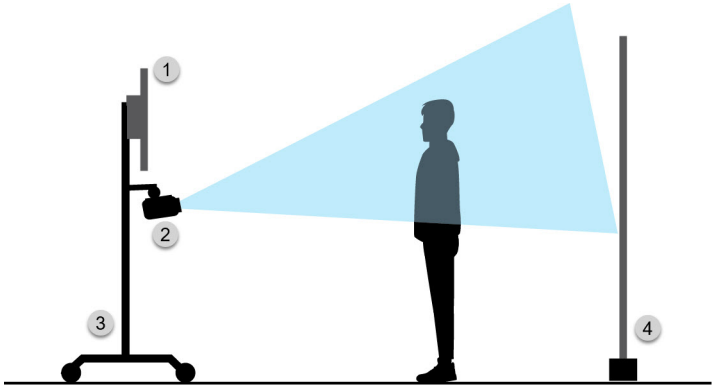
The thermal camera measures the temperature around the tear duct of the screened person, analyzes the measured temperature, and displays a screening result.

For improved measurement accuracy, it is important that the screened person is at the correct distance from the camera. The screening position indicates where the person should stand for the screening.

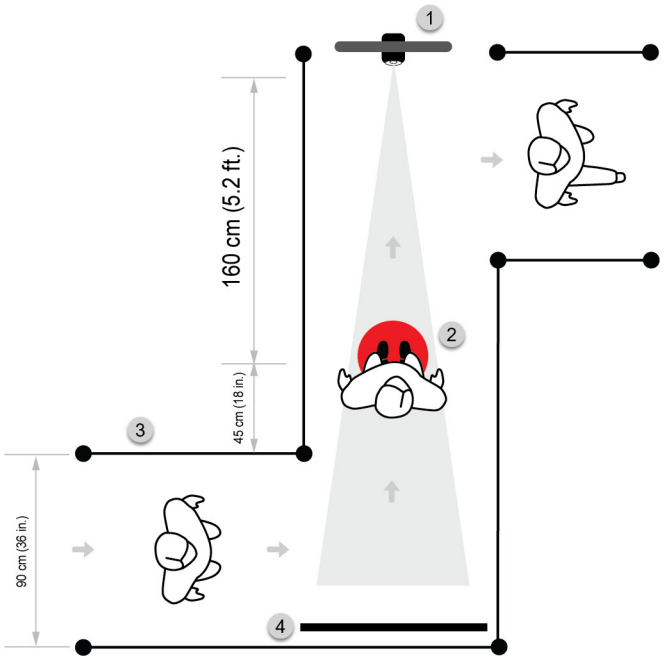
For an efficient screening flow, a queueing system is needed to guide the visitors into the screening station, to the correct screening position, and out of the screening station. A backdrop may be needed to prevent background disturbances from reaching the camera.

11.2 Typical setup

The figures below show a typical screening station setup.



1. Visitor display
2. Thermal camera
3. Stand
4. Optional: Backdrop



1. Stand with thermal camera and display.
2. Screening position.
   It is important to clearly mark where the person shall stand for the screening. This is called the screening position. The face of the screened person should be at the center of the screening position.
   The screening position shall be perpendicular to the camera, so that the screened person directly faces the camera. The distance from the camera lens to the center of the screening position shall be 160 cm (5.2 ft.).

   Explanation:

   - For accurate temperature measurements, it is important that the thermal camera focus is correct. With a fixed screening position, the focus can be adjusted once and for all during the initiation of the screening (no need to adjust the focus for every screened person).

3. Queueing system, e.g. barriers and arrow floor stickers.
   The queueing system will guide the visitors into the screening station, to the correct screening position, and out of the screening station. A recommended standard is to keep the queue at least 90 cm (36 in.) wide. To make sure people do not cut the corner and end up too close to the camera, about 45 cm (18 in.) should be added to the barrier leading in to the screening station.
4. Optional: Backdrop.
   The camera should only see the screened person, no other people in the background. This can be achieved by placing a backdrop behind the screening position.

Additional, not in the figure:

- Bluetooth button (Remote operation button).
  Used in Button mode to trigger the screening.
- Optional: Operator display.
  Secondary display placed near the operator for monitoring.
- Optional: Information roll-up.
  Roll-up that informs people what the screening is about and why they need to do it.
- Optional: Instruction roll-up.
  Roll-up that tells people to remove eyeglasses before they are screened.

  Note Removing eyeglasses is crucial for a correct screening result.

Note The setup as described in this section is adapted for persons with an average height of 170 cm (5.6 ft.). With this setup, the system will screen persons with a height of 150-195 cm (4.9–6.4 ft.). To adapt the setup for other average heights, see section 10.4 *Height of screened persons*.

11.3 Screening station considerations

For accurate screening results and an efficient screening flow, the following factors related to the screening station area should be considered.

Screening accuracy

- Screening is best with room temperatures maintained below 24°C (76°F) and relative humidity below 50 %.
- Screening should be carried out in an area with no air movement, out of direct sunlight, and away from heat sources.
- Avoid locations with reflective backgrounds (e.g. windows, glass doors, or metallic surfaces).

Equipment

- The screening equipment is intended for indoor use.
- Decide where the visitor display and the camera shall be placed and how they shall be mounted.
- The screening equipment shall preferably be placed so that the operator can see the screening station and be of guidance to the screened persons.
- It can be useful to have a secondary display for the operator, e.g. on the reception desk.
- Power outlets are needed for the camera, computer, visitor display, and any operator display.
- Avoid reflections in the visitor display. Otherwise, it can be difficult for the visitors to see the graphics and messages on the display.

Visitors and queueing

- Plan how the visitors will flow into the screening station and out, both in low and high flow periods. Plan for any alternative routes, e.g. after an alarm, for any questions, for persons in a wheelchair or with other special requirements.
- Consider personal integrity matters; e.g. if the visitor display should be hidden from others than the screened person. See also section 11.4 *Company policies*.
- Allow for appropriate distancing between people in the screening queue.
- Allow for people to stabilize their temperature if it was raised by exercise or physical activity.

11.4 Company policies

The FLIR EST screening system only detects elevated skin temperatures. It is up to your company to set up a suitable screening process in accordance with applicable local data protection, employment, and health and safety laws.

These are some of the factors your company need to consider:

- Personal integrity
  Make decisions on how to handle personal integrity, e.g. show/hide the visitor display for others than the screened person, have/not have a sound alarm.
- Process for alarms
  Establish a process for those individuals where the system has indicated an elevated temperature, e.g. let the person sit down for 10 minutes and then do the screening again, further evaluation by medically trained personnel.
- Visitor information
  Provide visitors with information and instructions about the screening, e.g. by roll-ups.

12 Operation — Operator instructions (Auto and Button mode)

This chapter focuses on the operator. It describes how the screening station works and how you operate the station in Auto mode and Button mode.

12.1 Screening station

The FLIR EST Thermal Screening system is used to screen persons for elevated skin temperatures. An alarm will trigger when the measured temperature is higher than a reference temperature.

The system measures the temperature at the tear duct. For that reason, it is important that the eyes of the screened person are not covered by eyeglasses, hair, or other items.

It is up to your company to establish a process for screening alarms. You must know what you and the visitor shall do if the system indicates an elevated temperature.

For accurate and efficient screening, it is recommended that the screening station is set up as described in chapter 10 *Setup — Screening station (Auto and Button mode)*. Figure 12.1 *Typical screening station* shows a typical screening station.

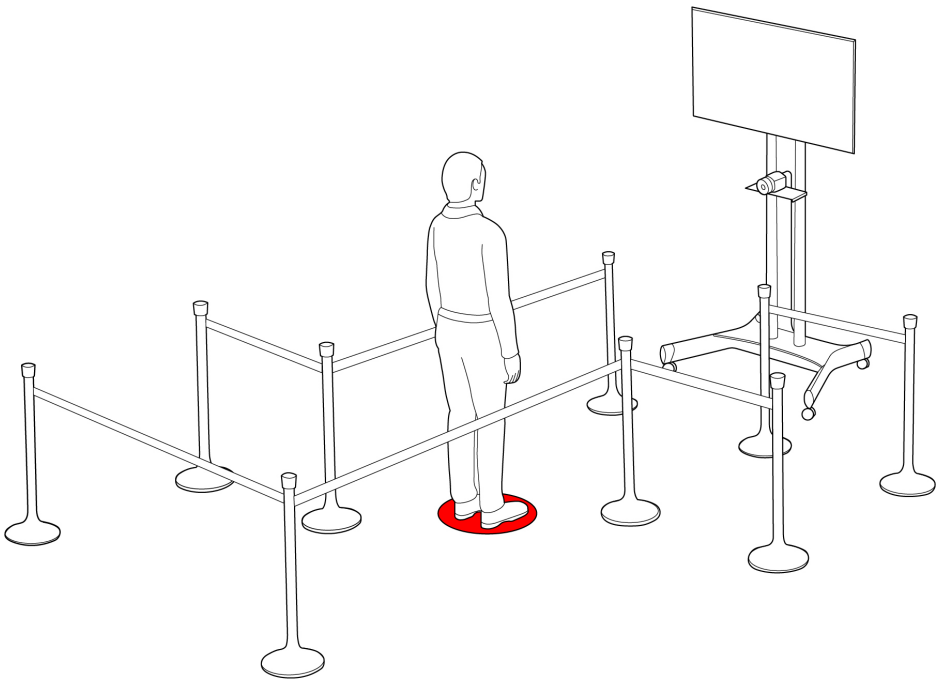


Figure 12.1 Typical screening station

The screening station typically includes the following equipment:

- Stand with thermal camera and visitor display.
- Bluetooth button, used to trigger the screening in Button mode.
- Screening position.
  It is important that the screened person stands at the correct distance from the camera. This is called the screening position. During the setup of the screening station, the screening position should have been clearly marked by a floor sticker.
- Queueing system, e.g. barriers and arrow floor stickers.
  The queueing system guides the visitors into the screening station, to the correct screening position, and out of the screening station.
- Information roll-up.
  Roll-up that informs people what the screening is about and why they need to do it.
- Instruction roll-up.
  Roll-up that tells people to remove eyeglasses before they are screened.

Note Removing eyeglasses is crucial for a correct screening result.

- Optional: Backdrop.
  A backdrop may be needed to prevent background disturbances from reaching the camera, such as passing or queueing people.
- Optional: Operator display.
  Secondary display placed near the operator for monitoring.

12.2 Quick guide to the camera

12.2.1 Turn on/off the camera

The camera can be powered continuously, but you may want to turn of the equipment, e. g. to save energy or make room for cleaning.

- To turn on the camera, push the on/off button ⏻.
- To turn off the camera, push and hold the on/off button ⏻ for more than 0.5 second.

12.2.2 Menu system

To display the menu system, push the navigation pad or tap the menu system button •••.

To navigate the menu system, you can use the navigation pad or tap the camera screen.

12.3 Normal operation (Auto mode)

The normal screening workflow includes the following operator tasks:

1. Prepare the system for a new screening session, see section 12.3.1 *Start a new screening session*.
2. The screening normally does not require any action from you. Depending on your workflow, you may need to be available for guidance and alarms. See also section 12.3.2 *Screening procedure*.

If you run into problems, see section 12.5 *Problems — What shall I do?*.

You may get questions from the visitors about the screening. For answers to common questions, see section 12.6 *Visitor FAQ*.

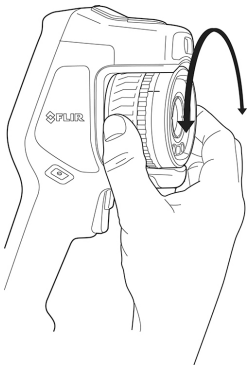
12.3.1 Start a new screening session

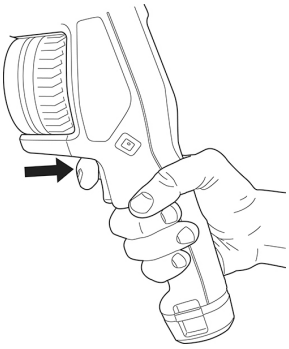
1. Make sure the screening station is in order:
   - The stand with the camera and visitor display is placed at the correct position in front of the screening position.
   - The screening position is clearly marked.
   - The camera is turned on. If not, see section 12.2.1 *Turn on/off the camera*.

     Note The camera should be allowed to warm up for about 20 minutes before performing the screening. This will help ensure the best results.
   - The lens cover is removed from the camera.
   - The camera image is visible on the display.
   - The barriers, roll-ups, etc. are in place.
2. Enter initiation mode by first selecting another Recording mode and then selecting the Screening mode again.

   To change the Recording mode, select ⚙ (*Settings*) > *Recording mode*.
3. In the *Screening* dialog box, select *Auto*.

4. The camera must first record an initial sample for the reference temperature calculation.
   Place a healthy person at the marking on the tape that indicates the screening position. The camera graphics may indicate that the person needs to move closer to the camera, which is OK to do.
5. Make sure the person looks into the camera and stands still until a screening result is displayed.
6. Check that the camera focus is correct and that the measurement was done at the tear duct. If not, deactivate and activate the Screening mode again and restart the initiation.
7. Wait for two minutes. Make sure there is no people or movement in front of the camera. During this time, the camera adapts to the ambient temperature.
8. Place a healthy person at the marking for the screening position (not closer or further away from the camera).
9. Check that:
   - A screening result is displayed with the person standing at the screening position (not closer).
   - The measurement was done at the tear duct. If not, deactivate and activate the Screening mode again and restart the initiation.
   - The camera focus is correct. If not, adjust the focus by rotating the focus ring or by pushing the autofocus button.





   - The camera is now ready to screen visitors.

Note If the camera is turned off, the system must be initiated again.

12.3.2 Screening procedure

Once the screening station is up and running, the screening station normally does not require any action from you. Depending on your workflow, you may need to be available for guidance and alarms.

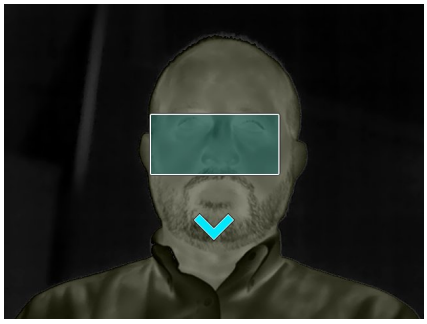
This is what happens during the screening:

1. The visitors enter the queue to the screening station.
2. One visitor at the time goes to the screening position.

   Note

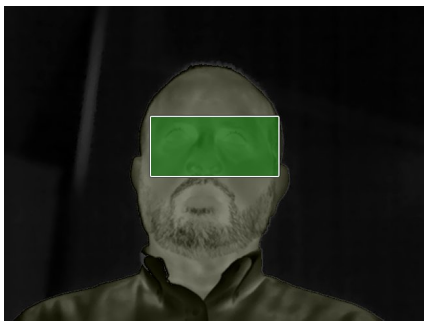
   - Removing eyeglasses is crucial for a correct screening result.
   - It is important to stand at the screening position (not closer or further away from the camera).
   - The eyes must not be covered.

3. The graphics guide the visitor to make sure the eyes are inside the box on the display.



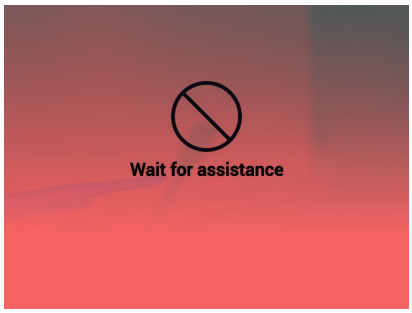
4. The visitor stands still and looks into the camera. The system automatically measures and evaluates the temperature.

   Note It is important to look straight into the camera.



5. The system displays a screening result.
   - **No elevated temperature detected**
     The visitor exits the screening station.

   - **Elevated temperature detected**
     You and the visitor follow the process for screening alarms that your company has established.



12.4 Normal operation (Button mode)

The normal screening workflow includes the following operator tasks:

1. Prepare the system for a new screening session, see section 12.4.1 *Start a new screening session*.
2. During the screening, you guide the visitors to a good screening and trigger the screening by pressing the Bluetooth button. For more information, see section 12.4.2 *Screening procedure*.

If you run into problems, see section 12.5 *Problems — What shall I do?*.

You may get questions from the visitors about the screening. For answers to common questions, see section 12.6 *Visitor FAQ*.

12.4.1 Start a new screening session

1. Make sure the screening station is in order:
   - The stand with the camera and visitor display is placed at the correct position in front of the screening position.
   - The screening position is clearly marked.
   - The camera is turned on. If not, see section 12.2.1 *Turn on/off the camera*.

     Note The camera should be allowed to warm up for about 20 minutes before performing the screening. This will help ensure the best results.

   - The lens cover is removed from the camera.
   - The camera image is visible on the display.
   - The barriers, roll-ups, etc. are in place.

2. Enter initiation mode by first selecting another Recording mode and then selecting the Screening mode again.

   To change the Recording mode, select (*Settings*) > *Recording mode*.

3. In the *Screening* dialog box, select *Button*.
4. Place a healthy person at the screening position. Make sure the person looks into the camera and stands still until the initiation is completed and a screening result is displayed.
5. Press the Remote operation button to start the initiation.
6. During the initiation, the camera automatically adjusts the focus and resets the reference temperature average.
7. When the initiation is completed, check that the camera focus is correct and that the measurement was done at the tear duct.
   If the camera is out of focus or the measurement was not done at the tear duct, deactivate and activate the Screening mode again and repeat the initiation.

Note If the camera is turned off, the system must be initiated again.

12.4.2 Screening procedure

During the screening, you guide the visitors to a good position and trigger the screening by pressing the Bluetooth button.

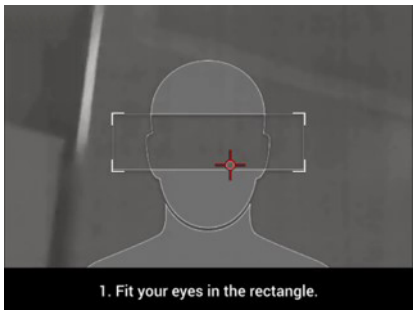
This is what happens during the screening:

1. The visitors enter the queue to the screening station.
2. One visitor at the time goes to the screening position.

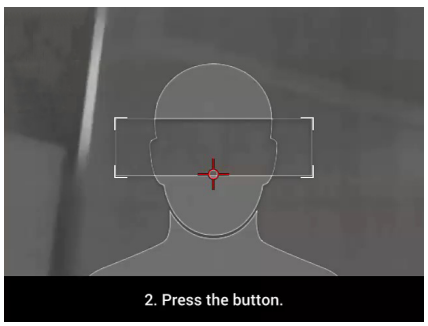
   Note

   - Removing eyeglasses is crucial for a correct screening result.
   - It is important to stand at the screening position (not closer or further away from the camera).
   - The eyes must not be covered.

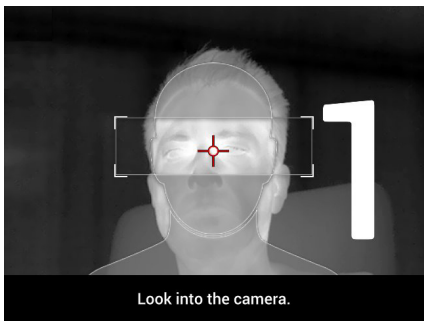
3. You may need to guide the visitor to make sure the visitor eyes are inside the box on the display.



4. Make sure the visitor is in a good position, stands still, and looks straight into the camera. Then press the Bluetooth button.

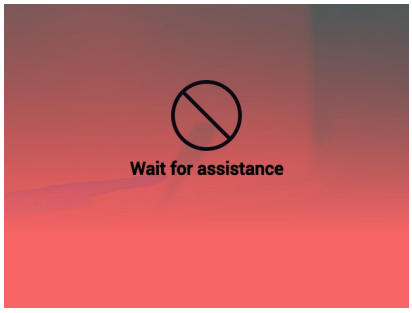


5. A counter appears on the display. When the counter reaches 0, the system measures and evaluates the temperature.



6. The system displays a screening result.
   - **No elevated temperature detected**
     The visitor exits the screening station.

   - **Elevated temperature detected**
     You and the visitor follow the process for screening alarms that your company has established.



12.5 Problems — What shall I do?

This section describes some actions you may need to perform and what you shall do in case of problems.

Note At FLIR Support Center, you can search our knowledge base to find answers to frequently asked questions. Go to http://support.flir.com.

12.5.1 All visitors get screening alarms

If all visitors get screening alarms and there is reason to believe that these are false alarms, do the following:

1. Restart the screening, see sections 12.3.1 *Start a new screening session* (Auto mode) and 12.4.1 *Start a new screening session* (Button mode).
2. If the problem still remains after the restart, see section 12.5.2 *False alarms*.

12.5.2 False alarms

If you are experiencing many false alarms, you may need to adjust the offset used to calculate the alarm threshold.

The offset value (allowed deviation) is how much the measured temperature can differ from the average temperature without triggering an alarm. A higher value will lead to fewer false alarms, but there will also be a risk of missing people with elevated skin temperatures. A lower value will detect smaller elevations in skin temperatures, but it will also generate more false alarms.

12.5.3 Somebody moved the equipment

The screening station is carefully set up to make sure the screening position is at the correct distance from the camera.

If the stand with the camera or the screening position floor sticker has been moved, do one of the following:

- If the position of the stand is marked, e.g. by tape on the floor, make sure to put the stand back in the correct position.
- If there are no markings for the stand or if the marking for the screening position has been moved, the entire screening station should be set up again following the instructions in chapter 10 *Setup — Screening station (Auto and Button mode)*.

12.5.4 False triggering

Persons and objects in the background can cause false triggering. To prevent background disturbances from reaching the camera, it is recommended to place a backdrop behind the screening position.

12.5.5 Cannot screen short/tall persons

The screened person shall stand at the screening position (not closer or further away from the camera).

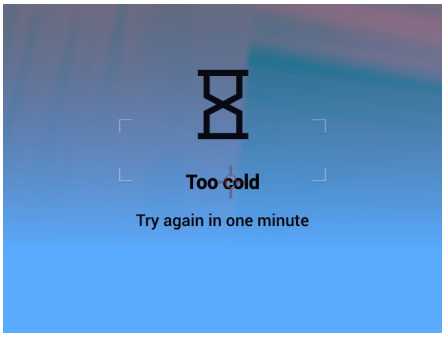
- Tall persons may have to bend their knees.
- Short persons may need e.g. a high chair to sit on.

The screening station is set up to screen persons with a height of 150-195 cm (4.9–6.4 ft.). To adapt the setup for other average heights, see section 10.4 *Height of screened persons*.

12.5.6 *Too cold* and *Too warm* messages

The system only evaluates temperatures within a certain temperature range. If the measured temperature is outside this range, a *Too cold* or *Too warm* message is displayed.

Note This message is not a screening result. The visitor should wait a few minutes and then try the screening again for a result (Normal or Elevated).



12.5.7 Many *Too cold* messages

The system only evaluates temperatures within a certain temperature range, see section 12.5.6 *Too cold and Too warm messages*. The temperature range is defined by the *Min skin temperature* and *Max skin temperature* settings. It is recommended to use the default values (min 32.5°C (90.5°F), max 41.5°C (106.7°F)). Only change the settings if you experience problems and understand the consequences.

In a situation where all visitors come directly from a cold outdoor environment, without possibility to adapt to the indoor temperature, the screening flow may be disturbed by many “Too cold” messages. By changing the *Min skin temperature* setting to a lower value, there will be fewer “Too cold” messages.

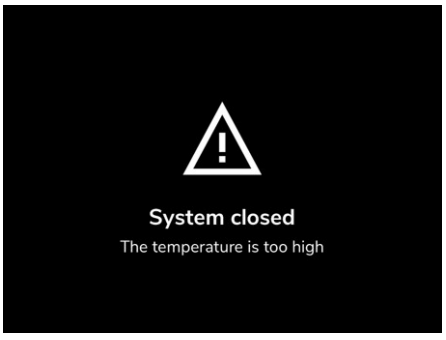
If you have visitors that come both from a cold outdoor environment and a warm indoor environment, you need to be careful about changing the *Min skin temperature* setting. With a lower value, there is a risk that people with an elevated temperature are not detected. For more information, see section 8.4 *Working principle (Auto and Button mode)*.

To change the *Min skin temperature*, select (*Settings*) > *Recording mode* > *Screening settings*.

12.5.8 Too hot background

If the background temperature is too hot, the camera cannot work. A message is displayed until the room cools off, the camera is protected from sunshine or other heat radiation, or the camera is moved.

If this happens often, the screening station should be moved to a more suitable location.



12.6 Visitor FAQ

This section helps you with answers to questions you may get from the visitors.

Is the screening dangerous?
No, a thermal camera is like a regular camera, except that it is sensitive to heat (thermal radiation) instead of visual light.

Why do I have to remove my eyeglasses?
The system measures the temperature in the area around the tear duct and a thermal camera cannot measure temperatures through eyeglasses. For a correct screening result, removing eyeglasses is crucial.

Do you save any information about me?
No, the system does not save any information that can be connected to any individual.

13 Operator mode screening

This chapter describes screening using the Operator mode.

13.1 Introduction

The basics of the Operator mode is to first build up a base of reference temperature samples. When a person is screened, the camera compares the measured temperature with the average of the reference samples. If the camera detects an elevated temperature, an alarm will trigger.

13.1.1 Important considerations

To ensure consistent measurements, it is important that the screened person is at a correct distance from the camera. The recommended distance is 1–2 m (3–6 ft.). The correct distance can be achieved by a marking on the floor or by using a silhouette in the camera graphics.

For accurate screening results, the following factors should be considered:

- Screening is best with room temperatures maintained below 24°C (76°F) and relative humidity below 50 %.
- Screening should be carried out in an area with no air movement, out of direct sunlight, and away from heat sources.
- Avoid locations with reflective backgrounds (e.g. windows, glass doors, or metallic surfaces).
- Allow for people to stabilize their temperature if it was raised by exercise or physical activity.

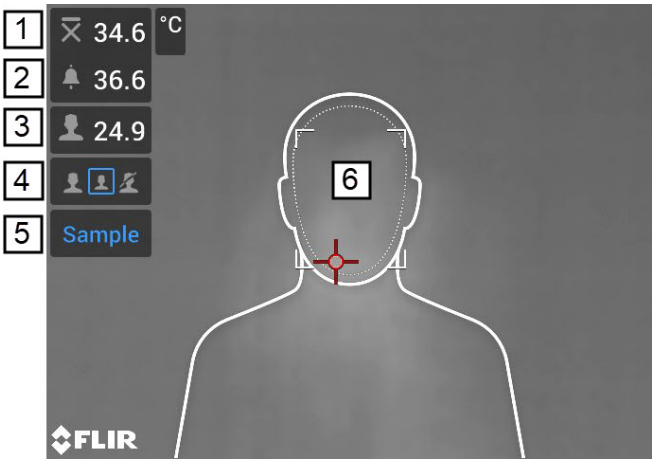
You should also consider personal integrity matters. For more information, see section 11.4 *Company policies*.

13.1.2 Work flow

The screening work flow involves the following steps:

1. Prepare the camera.
2. Activate and configure Operator mode.
3. Record reference samples.
4. Perform the screening.
5. Record new samples to keep the sampled average up to date.

13.2 User interface



1. Sampled average temperature.
2. Alarm limit.

3. Measured temperature.
4. Silhouette icons.
5. Sample button.
6. Measurement box.

The camera detects and measures the temperature of the hottest spot within the measurement box. A silhouette can be used to make sure the person is in a good position for the screening, with the measurement box covering the face.

An alarm will trigger when the measured temperature is higher than the alarm limit. The camera will also apply a red color to all parts of the image with a temperature above the alarm limit.

The alarm limit is the sum of a sampled average temperature and a specified allowed deviation.

13.3 Prepare the camera

13.3.1 New camera

If you have a new camera, do the following:

1. Charge the battery for 2 hours using the stand-alone battery charger.
2. Push the battery into the battery compartment. The battery makes a click when it locks in place.

13.3.2 Turn on the camera

- To turn on the camera, push the on/off button .
- To turn off the camera, push and hold the on/off button for more than 0.5 second.

13.3.3 Configure the camera

For accurate screening results, some important settings are needed in the camera.

You access the camera settings via the menu system.

- To display the menu system, push the navigation pad or tap the menu system button .
- To navigate the menu system, you can use the navigation pad or tap the camera screen.

To configure the camera, do the following:

1. Make sure automatic image adjustment mode is active by selecting (*Temperature scale*) and then (*Auto*).
2. Disable continuous autofocus by selecting (*Settings*) > *Device settings* > *Focus* > *Continuous autofocus* > *Off*.

Note When the Screening mode is activated, some more important settings are automatically made. For example, since the laser beam can cause eye irritation, the laser is automatically disabled.

13.4 Activate and configure Operator mode

1. Activate the screening mode by selecting (*Settings*) > *Recording mode* > *Screening*.

2. In the *Screening* dialog box, do the following:
   - Select the option *Operator*.
   - Select if there should be a beep or no sound when the system detects an elevated temperature.
   - Select the allowed deviation from the sampled average. It is recommended to start with the default value 1.0°C/1.8 °F.

13.5 Record reference samples

Before you can start the screening, you must record reference samples. These are used to calculate the reference temperature average.

You record the reference samples by screening a healthy person. Make sure this person represents normal people who will pass the screening (e.g. coming directly from outdoors, since this affects the skin temperature).

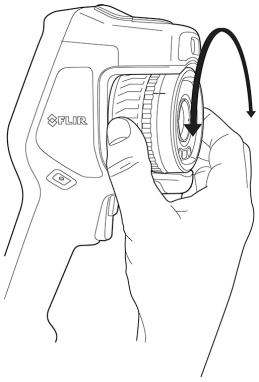
1. Aim the camera toward a healthy person. Make sure the person is in a good position for the screening.

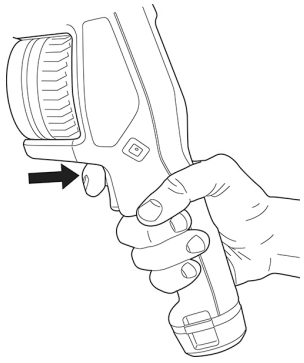
   Note

   - Removing eyeglasses is crucial for a correct screening result.
   - The eyes must not be covered.

2. Adjust the camera focus by rotating the focus ring or by pushing the autofocus button.

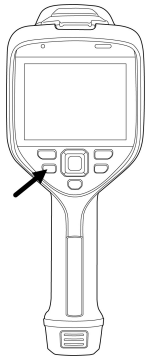
   Note It is important to adjust the focus correctly. Incorrect focus adjustment affects the temperature measurement.





3. To record a sample, tap *Sample* on the screen or push the P button.

   Note Push the P button shortly. If you push and hold the P button, the sampled average will be reset.



4. The camera counts the number of recorded samples and tells you how many more samples that are required.
   Repeat steps 1–3 until the required samples have been recorded.

13.6 Perform the screening

1. Aim the camera toward a person. Make sure the person is in a good position for the screening.

   Note

   - Removing eyeglasses is crucial for a correct screening result.
   - The eyes must not be covered.

2. Adjust the camera focus by rotating the focus ring or by pushing the autofocus button.

   Note It is important to adjust the focus correctly. Incorrect focus adjustment affects the temperature measurement.

3. The camera measures and evaluates the temperature. If the temperature is above the accepted range, an alarm will trigger. The camera will apply a red color to all parts of the image with an elevated temperature.

4. Optionally: Record a new sample.
   Tap *Sample* on the screen or push the P button.

   Note Push the P button shortly. If you push and hold the P button, the sampled average will be reset.

13.6.1 Keep the average up to date

To keep the sampled average up to date, you should record new samples often. By that, you can avoid false alarm and secure a more accurate screening.

When the camera tells you that a new sample is needed, you must record a new sample. If the ambient temperature varies a lot during the day (outside/inside), it is recommended to record more than one new sample.

Note Every time you tap *Sample* on the screen or push the P button, a sample is recorded. If you happen to record a sample when the camera is not aiming at a person, you must reset the sampled average and record 10 new samples. To reset the sampled average, push and hold the P button.

14 Camera functions

In addition to the screening functionality, the FLIR Exx-EST camera has the same thermography functions as the standard FLIR Exx camera. However, the temperature range of the FLIR Exx-EST camera is limited to 15 to 45°C (59 to 113°F), meaning that the use of the thermography functions is limited.

14.1 Thermography functions

This section provides a brief description of the thermography functions. For more detailed information, refer to the FLIR Exx user's manual.

14.1.1 Color palettes

From the *Color* menu, you can change the color palette that the camera uses to display different temperatures. A different palette can make it easier to analyze an image.

14.1.2 Adjusting the temperature scale

By default, the camera continuously adjusts the image for the best image presentation.

You can also manually adjust the temperature scale to values close to the temperature of a specific object in the image. This will make it possible to detect smaller temperature differences.

- In live mode, select (*Temperature scale*) and then (*Auto*) or (*Manual*) to enter automatic or manual image adjustment mode.
- In preview/edit mode, manual image adjustment mode is active.

In manual mode, you can do one or more of the following:

- To simultaneously change the temperature scale minimum and maximum limits, place your finger on the screen and move it up/down.
- To change the minimum or the maximum limit, do the following:
  1. Touch the maximum or minimum temperature that you want to change.
  2. Place your finger on the screen and move it up/down to change the value of the highlighted temperature.
- To enhance the details of a certain point of interest in the image, touch that point on the screen. The image will be auto-adjusted based on the thermal content of the area around the touched point.

14.1.3 Image modes

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

The camera supports the following image modes:

- *Thermal*: An infrared image is displayed.
- *Thermal MSX* (Multi Spectral Dynamic Imaging): The camera displays an infrared image where the edges of the objects are enhanced with visual image details.
- *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 is displayed.

14.1.4 Measurement tools

To measure temperatures, the camera can use one or more measurement tools, e.g., a spotmeter or a box. It is possible to add/remove tools from the *Measurement* menu.

Note

- A thermal camera measures surface temperatures. The camera cannot measure core body temperature or diagnose a fever.
- For accurate temperature measurements, it is very important to adjust focus correctly.

14.1.4.1 Measurement parameters

The measurement parameters are important for accurate measurements. In Screening mode, the camera automatically sets the appropriate parameters.

There is typically no need to change the default measurement parameters, see table below.

Object distance	1.0 m (3.3 ft.)
Atmospheric temperature	20°C (69°F)
Relative humidity	50%
Reflected temperature	20°C (69°F)
Emissivity	0.95

14.1.5 Color alarms

By using color alarms, anomalies can easily be discovered in an infrared image. The color alarm applies a contrasting color to all pixels with a temperature above, below, or between the set temperature levels. The color alarms are available on the *Color* menu.

14.1.6 Non-uniformity correction (NUC)

When the thermal camera displays *Calibrating...* it is performing what in thermography is called a ”non-uniformity correction” (NUC).

An NUC is performed automatically, for example at start-up or when the environment temperature changes.

It is also possible to perform an NUC manually, by pushing and holding down the image archive button ▶ for more than 2 seconds.

14.2 Saving images and video

14.2.1 General

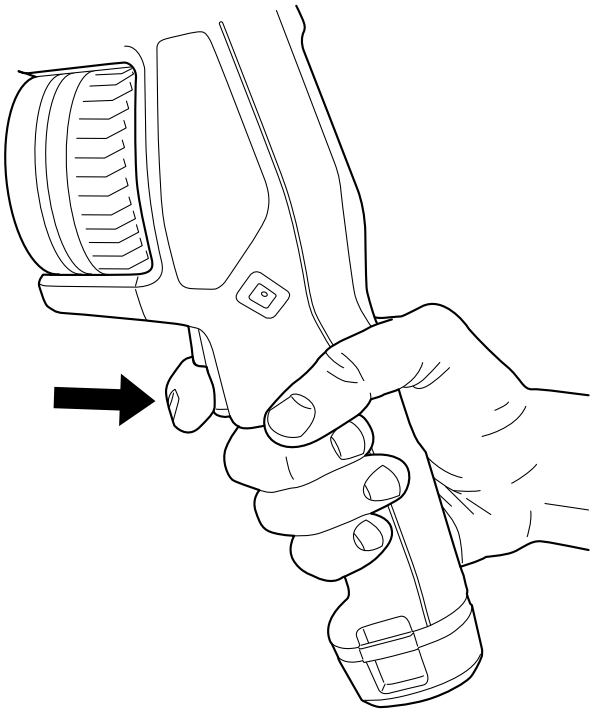
When you save an image or record a video clip, the camera stores the image or video file on the memory card.

For instructions on how to insert the memory card, see section .

Note Empty or use a memory card that has not previously been used in another type of camera. The cameras may organize files differently on the memory card. There is therefore a risk of losing data if the same memory card is used in different types of cameras.

14.2.2 Saving an image

To save an image, pull the trigger.



14.2.3 Annotating images

You can save additional information with an infrared image by using annotations. Annotations are added to the image file, and can be viewed and edited in the image archive.

- You can set the camera to display annotation tools when an image is saved. Select (*Settings*) > *Save options & storage* > *Add annotation after saving*.
- You can also add annotations to a saved image in the image archive.

14.2.4 Programming the camera (time-lapse)

You can program the camera to save images periodically (time-lapse).

1. Select (*Settings*) > *Recording mode* > *Time-lapse*.
2. Push the navigation pad. This displays a dialog box where you can set the save conditions:
   - *Save interval*: The time interval between each saved image.
   - *Total number of images*: Periodic saving will stop when the set number of images have been saved.

     Note If you select "∞," the camera will keep on saving images until the memory card is full or until you manually stop the time-lapse.
3. To start the time-lapse (periodic saving), pull and release the trigger.
4. To manually stop the time-lapse, pull and release the trigger.
5. When the time-lapse is completed, an information screen is displayed. Push any button or touch the screen to return to the live image.

14.2.5 Recording a video clip

To record and save video clips, do the following:

1. Select (*Settings*) > *Recording mode* > *Video*.
2. To start a recording, pull and release the trigger. A counter at the top of the screen displays the duration of the recording.

3. To stop a recording, pull and release the trigger. The recording is automatically saved to the image archive.

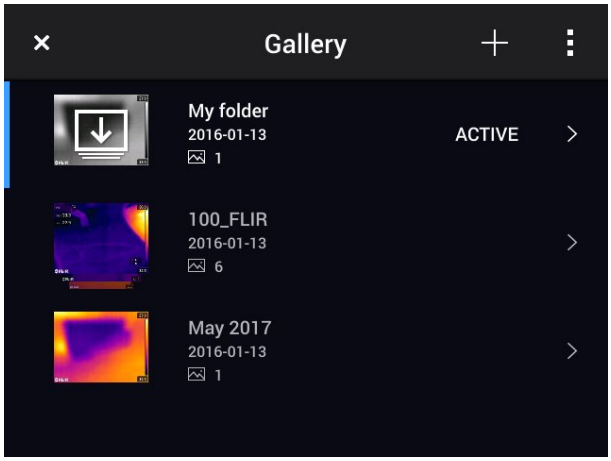
You can open and play saved video clips from the image archive. For more information, see section 14.3.4 *Opening a saved video clip*.

14.3 Gallery — image and video archive

14.3.1 General

When you save an image or video clip, the camera stores the image/video file in the image archive on the memory card. You can open an image in the image archive and, for example, select another image mode, apply color alarms, and add measurement tools. You can also open and play saved video clips.

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



14.3.2 Opening a saved image

1. Push the image archive button. This displays the *Gallery* with one or more folders.
2. Select a folder and push the navigation pad.
3. Select the image you want to view and push the navigation pad.
4. To display a toolbar at the top of the screen, push the navigation pad. Do one or more of the following:
   - To switch between an infrared image and a visual image, select the icon and push the navigation pad.
   - To edit the image, delete the image, display image information, or add annotations, select the icon and push the navigation pad. This displays a menu to the right.
5. To view the previous/next image, push the navigation pad left/right.
6. To return to the folder overview, push the back button.
7. To return to the *Gallery*, push the back button again.

14.3.3 Editing a saved image

To edit a saved image, do the following:

1. Push the image archive button . This displays the *Gallery* with one or more folders.
2. Select a folder and push the navigation pad.
3. Select the image you want to edit and push the navigation pad.
4. Push the navigation pad to display the top toolbar.
5. On the top toolbar, select the icon and push the navigation pad.
6. On the right toolbar, select the icon and push the navigation pad. This opens the image in edit mode.
7. Manual image adjustment mode is now active. For image adjustment instructions, see section 14.1.2 *Adjusting the temperature scale*.
8. Push the navigation pad. This displays a context menu including options such as changing color palette and changing image mode.

14.3.4 Opening a saved video clip

1. Push the image archive button . This displays the *Gallery* with one or more folders.
2. Select a folder and push the navigation pad.
3. Select the video clip you want to view and push the navigation pad.
4. To play the video clip, do the following:
   4.1. Push the navigation pad to display the top toolbar.
   4.2. On the top toolbar, select the icon and push the navigation pad.
   4.3. To play or pause the video clip, push the navigation pad.
5. To view the previous/next video clip, push the navigation pad left/right.
6. To return to the folder overview, push the back button .
7. To return to the *Gallery*, push the back button again.

14.3.5 Creating a new folder

1. Push the image archive button . This displays the *Gallery*.
2. On the top toolbar, select the icon and push the navigation pad.
3. A soft keyboard is displayed, where you can enter the name of the folder by touching the screen.
4. When completed, touch *Done* on the soft keyboard.
5. The new folder automatically becomes the active folder and appears at the top of the *Gallery*.

14.3.6 Renaming a folder

You can change the name of the folders in the archive. The active folder cannot be renamed.

1. Push the image archive button . This displays the *Gallery*.
2. On the top toolbar, select the icon and push the navigation pad.
3. Select the folder to rename and push the navigation pad.
4. On the right toolbar, select the Aa icon and push the navigation pad.
5. A soft keyboard is displayed, where you can enter the new name of the folder by touching the screen.
6. When completed, touch *Done* on the soft keyboard.

14.3.7 Changing the active folder

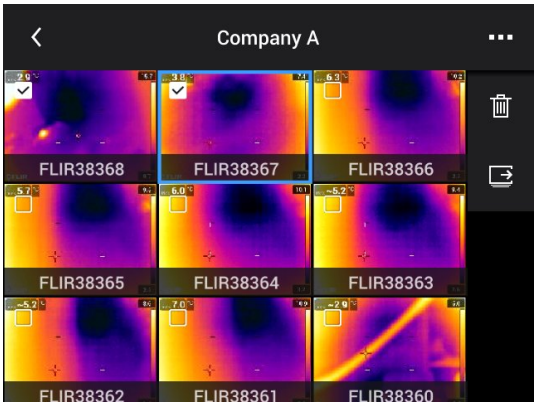
New images and video clips are saved to the active folder.

To change the active folder, do the following:

1. Push the image archive button. This displays the *Gallery*.
2. On the top toolbar, select the icon and push the navigation pad.
3. Select the folder that new images and video clips should be saved to and push the navigation pad. This marks the selected folder with a tick.
4. On the right toolbar, select the icon and push the navigation pad.
5. The selected folder is moved to the top of the *Gallery*.

14.3.8 Moving files between folders

1. Push the image archive button. This displays the *Gallery*.
2. Select a folder and push the navigation pad.
3. On the top toolbar, select the icon and push the navigation pad.
4. Use the navigation pad to select the image and video items you want to move. You can also select the items by touching the screen. Selected items are marked with a tick.



5. On the right toolbar, select the icon and push the navigation pad.
6. Select the destination folder for the selected items and push the navigation pad.

14.3.9 Deleting a folder

You can delete a folder in the archive. The active folder cannot be deleted.

1. Push the image archive button. This displays the *Gallery*.
2. On the top toolbar, select the icon and push the navigation pad.
3. Select the folder to delete and push the navigation pad.
4. On the right toolbar, select the icon and push the navigation pad. This displays a dialog box.
5. To delete the folder, select *Delete* and push the navigation pad.

14.3.10 Deleting an image or video file

You can delete an image or video file from the image archive.

Note When deleting an image file, both images in the image file (thermal and visual) will be deleted.

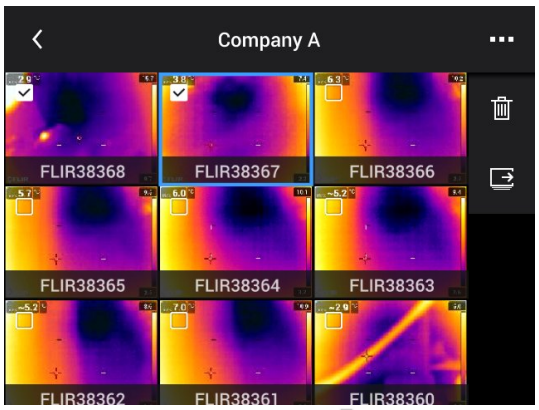
1. Push the image archive button. This displays the *Gallery*.
2. Select a folder and push the navigation pad.
3. Select the image or video clip you want to delete and push the navigation pad.

4. Push the navigation pad to display the top toolbar.
5. On the top toolbar, select the icon and push the navigation pad.
6. On the right toolbar, select the icon and push the navigation pad. This displays a dialog box.
7. To delete the image, select *Delete* and push the navigation pad.

14.3.11 Deleting multiple files

You can delete multiple image and video files from the image archive.

1. Push the image archive button. This displays the *Gallery*.
2. Select a folder and push the navigation pad.
3. On the top toolbar, select the icon and push the navigation pad.
4. Use the navigation pad to select the image and video items you want to delete. You can also select the items by touching the screen. Selected items are marked with a tick.



5. On the right toolbar, select the icon and push the navigation pad. This displays a dialog box.
6. To delete the selected items, select *Delete* and push the navigation pad.

14.3.12 Deleting all files

You can delete all image and video files from the memory card.

Follow this procedure:

1. Push the navigation pad to display the menu system.
2. Select (*Settings*) and push the navigation pad. This displays the *Settings* menu.
3. Use the navigation pad to select *Save options & storage* > *Delete all saved files...* .
4. Push the navigation pad. This displays a dialog box.
5. To permanently delete all saved files, select *Delete* and push the navigation pad.

14.4 About image and video files

14.4.1 File-naming convention

The default naming convention for image and video files is FLIRxxxx.jpg, where xxxx is an incremental counter.

It is also possible to save files with a prefix added to the filename, including the date and the text “IR_” for images and “MOV_” for videos. However, these files may not automatically be detected by third-party applications.

For more information, see the setting *File naming format* in section 15.4 *Save options & storage*.

14.4.1.1 Resetting the image counter

Note To prevent image files being overwritten, the new counter value will be based on the highest existing filename number in the image archive. To ensure that the counter is reset to 0001, insert an empty memory card before resetting the counter.

To reset the numbering of the image/video filenames, do the following:

1. Push the navigation pad to display the menu system.
2. Select  (*Settings*) and push the navigation pad. This displays the *Settings* menu.
3. Use the navigation pad to select *Device settings* > *Reset options* > *Reset image counter...*.
4. Push the navigation pad. This displays a dialog box.
5. To reset the counter, select *Reset* and push the navigation pad.

14.4.2 Image files

The camera saves an image file that includes all thermal and visual information. This means that you can open an image file at a later time and, for example, change the color palette, apply another image mode, and add measurement tools.

The image *.jpg file is fully radiometric and saved lossless, which enables full post-processing in image analysis and reporting software from FLIR Systems. There is also a regular *.jpg component (lossy) for convenient viewing in non-FLIR Systems software (e.g., Microsoft Explorer).

14.4.3 UltraMax

UltraMax is an image enhancement feature that increases the image resolution and lowers the noise, making small objects easier to see and measure. An UltraMax image is twice as wide and high as an ordinary image.

When an UltraMax image is captured by the camera, several ordinary images are saved within the same file. Capturing all the images can take up to 1 second. To fully utilize UltraMax, the images need to be slightly different, which can be accomplished by a minute movement of the camera. You should hold the camera firmly in your hands (do not put it on a tripod), which will make these images vary just a little during the capture. Correct focus, a high-contrast scene, and a non-moving target are other conditions that help to achieve a good-quality UltraMax image.

15 Camera settings

The *Settings* menu includes the following:

- *Recording mode*.
- *Connections*.
- *Camera temperature range*.
- *Save options & storage*.
- *Device settings*.

15.1 Recording mode

The *Recording mode* is used to select:

- *Single shot*: This setting enables single shot mode. In this mode, you save an image by pulling the trigger.
- *Video*: This setting enables video recording mode.
- *Time-lapse*: This setting enables time-lapse mode.
- *Screening*: This setting enables screening mode.
- *Screening settings* (Applicable to Auto and Button mode): The screening algorithm only evaluates temperatures between the *Max skin temperature* and *Min skin temperature* settings. It is recommended to use the default values (min 32.5°C (90.5°F), max 41.5°C (106.7°F)).

15.2 Connections

- *Wi-Fi*: This setting defines Wi-Fi networks. For more information, see section 7.9 *Configuring Wi-Fi*.
- *Bluetooth*: This setting defines Bluetooth connectivity. For more information, see section 7.10 *Pairing Bluetooth devices*.

15.3 Camera temperature range

The *Camera temperature range* menu displays the temperature range of the camera. The unit (°C or °F) depends on the temperature unit setting, see section 15.5 *Device settings*.

15.4 Save options & storage

- *Preview image before saving*: This setting defines if a preview image will be displayed before the image is saved.
- *Add annotation after saving*: This setting defines if an annotation tool will be displayed when the image has been saved. Available options are:
  - *Save*: No annotation tool will be displayed.
  - *Save & add note*: The note annotation tool will be displayed.
  - *Save & add table*: The table annotation tool will be displayed.
  - *Save & add voice annotation*: The voice annotation tool will be displayed.
  - *Save & add sketch*: The sketch annotation tool will be displayed.
  - *Save & add any annotation*: The annotation tool menu will be displayed.
- *Image resolution*[3]: This setting defines the resolution of the images captured by the camera. Available options are *Normal* and *UltraMax*. For more information, see section 14.4.3 *UltraMax*.
- *Video compression*: This setting defines the storage format for video clips. Available options are:
  - *Mpeg (*.mpeg)*: MPEG recordings cannot be edited after the file has been saved.
  - *Radiometric storage (*.csq)*[4]: A CSQ file supports full radiometry but is only supported by FLIR Systems software. The file does not include any visual image information. With this setting, only *Thermal* image mode is supported when recording video.

3. This item is dependent on the camera model.
4. This item is dependent on the camera model.

- *Photo as separate JPEG*: For the *Thermal MSX*, *Thermal*, and *Picture in picture* image modes, 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.
- *Digital camera*: This setting is used to turn on/off the digital camera. When the digital camera is off, the images modes *Thermal MSX* and *Picture in picture* are disabled.
- *Measure distance*[5]: This setting defines if the laser distance meter will be used to measure the distance when an image is saved. With this setting, the *Object distance* parameter in the image data is automatically updated with the measured distance when an image is saved. (There is no effect on the *Object distance* setting in live mode.)
- *File naming format*: This setting defines the naming format for new image/video files. The setting has no impact on already saved files in the archive. Available options are:
  - *DCF*: DCF (Design rule for Camera File system) is a standard that specifies the naming method of image files (and much more). With this setting, the name of a saved image/video file will be FLIRxxxx, where xxxx is an incremental counter. Example: FLIR0001. (When the counter has reached 9999, the file name will change to IR_yyyyy.jpg.)
  - *Date prefix*: A prefix will be added to the filename, including the date and the text “IR_” for images and “MOV_” for videos. Examples: IR_2015-04-22_0002 and MOV_2015-04-22_0003. The date format will follow the *Date & time format* setting, see section 15.5 *Device settings*.

    Note With the *Date prefix* setting, the files may not automatically be detected by third-party applications.
- *Delete all saved files...*: This displays a dialog box where you can choose to permanently delete all the saved files (images and videos) from the memory card or to cancel the delete action.

15.5 Device settings

- *Language, time & units*: This submenu includes settings for a number of regional parameters:
  - *Language*.
  - *Temperature unit*.
  - *Distance unit*.
  - *Time zone*.
  - *Date & time*.
  - *Date & time format*.
- *Focus*[6]: This submenu includes the following settings:
  - *Autofocus*: When autofocusing, the infrared camera can use one of the following focus methods:
    - *Contrast*: The focus is based on maximizing the image contrast.
    - *Laser*: The focus is based on a laser distance measurement. The laser is on when the camera is autofocusing.
  - *Continuous autofocus*: This setting is used to enable/disable continuous autofocus.
- *Display settings*: This submenu includes the following settings:
  - *Screen rotation*: This setting defines if the orientation of the overlay graphics will change according to how you hold the camera.

    Note You can also enable/disable screen rotation on the swipe-down menu.

5. This item is dependent on the camera model.
6. This item is dependent on the camera model.

- ◦ *Image overlay information*: This setting specifies what image information the camera will display as an overlay on the image. You can select the following information to display:
  - *Compass*.
  - *Date & time*.
  - *Emissivity*.
  - *Reflected temperature*.
  - *Distance*.
  - *Relative humidity*.
  - *Atmospheric temperature*.

  Note This setting only specifies what information to overlay on the image. All image information is always saved to the image file and is available in the image archive.
- ◦ *Screen brightness*: The screen brightness slider is used to control the brightness of the screen.

  Note You can also control the screen brightness on the swipe-down menu.

- *Geolocation*: This submenu includes the following settings:
  - ◦ *GPS*: This setting is used to enable/disable the GPS.
  - ◦ *Compass*: This setting is used to enable/disable the compass and to calibrate the compass.
- *Lamp & laser*: This submenu includes the following settings:
  - ◦ *Enable lamp & laser*: This setting is used to enable the camera lamp and the laser.
  - ◦ *Enable lamp & laser + Use lamp as flash*: This setting is used to enable the flash function. When the flash function is enabled, the camera lamp will flash when an image is saved.
  - ◦ *Disable all*: This setting is used to disable the camera lamp, laser, and flash function.
- *Auto power off*: This setting defines how soon the camera is automatically turned off.
- *User interface options*: This submenu includes the following settings:
  - ◦ *Manual adjustment using touch*: This setting is used to enable/disable the touch functionality for manual image adjustments.
  - ◦ *Manual adjustment mode*: This setting specifies the type of manual image adjustment mode. Available options are *Level, Max, Min* and *Level, Span*.
  - ◦ *Emissivity mode*: This setting specifies how the measurement parameter emissivity will be entered. Available options are *Select values* and *Select from materials table*.
- *Volume*: The volume slider is used to control the volume of the built-in speaker.
- *Reset options*: This submenu includes the following settings:
  - ◦ *Reset default camera mode...*: This setting 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 setting 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 setting will reset the numbering of the image filenames. To prevent image files being overwritten, the new counter value will be based on the highest existing filename 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*: This submenu displays information about the camera. No changes can be made.
  - ◦ *Model*.
  - ◦ *Serial number*.
  - ◦ *Part number*.

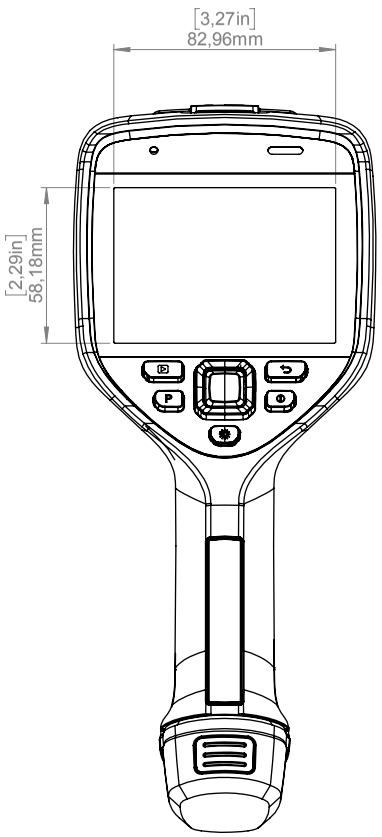
- *Software*: The version of the software.
- *Storage*: The used and free space on the memory card.
- *Lens*: The field of view of the lens.
- *Calibrate lens...*[7]: This will start the lens–camera calibration wizard.
- *Battery*: The remaining battery capacity (in percent).
- *Register camera...*: This will start the registration wizard.
- *Licenses*: Open-source license information.

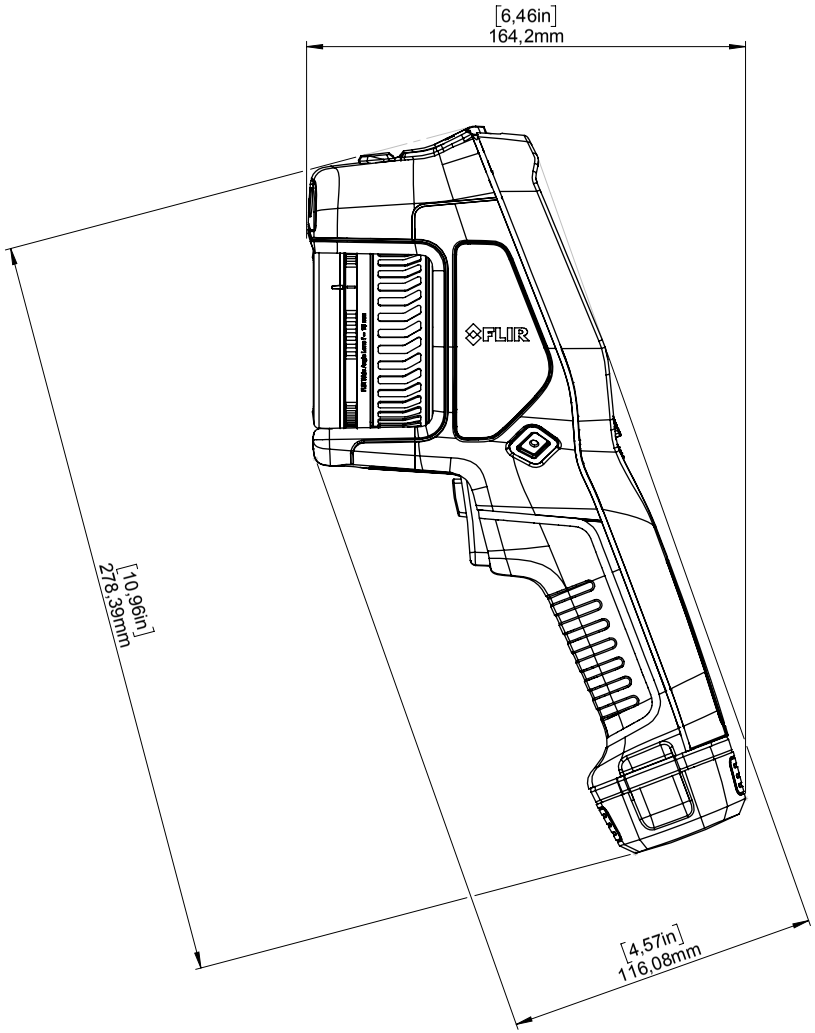
- *Regulatory*: Displays regulatory information about the camera. No changes can be made.

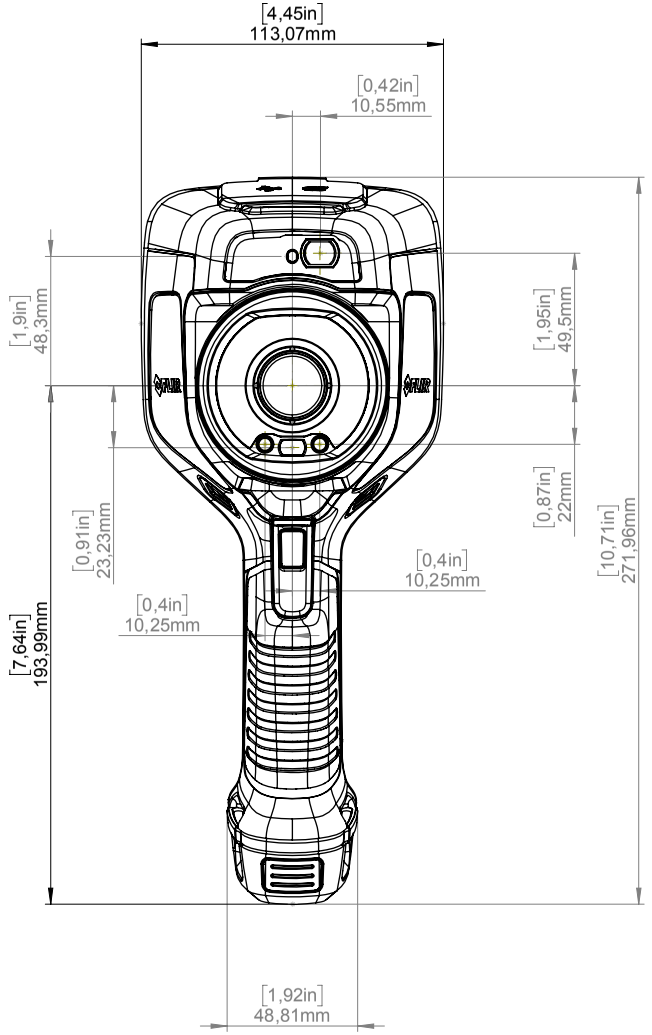
7. This item is dependent on the camera model.

16 Mechanical drawings

[See next page]







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2016-12-20	FRGU	R&D Instruments

Denomination

Basic dimension drawing Exx

Size	Sheet
A3	1(1)

Scale 1:2

Drawing No.	Rev
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17 CE Declaration of conformity

[See next page]

August 26, 2020 Täby, Sweden AQ320222

CE Declaration of Conformity – EU Declaration of Conformity

Product: FLIR E53 /E54 /E75 /E76 /E85 /E86 /E95 /E96 -series
Name and address of the manufacturer:
FLIR Systems AB
PO Box 7376
SE-187 15 Täby, Sweden

This declaration of conformity is issued under the sole responsibility of the manufacturer.
The object of the declaration: FLIR E53 /E54 /E75 /E76 /E85 /E86 / E95 /E96-series (Product Model Name FLIR-E7850).
The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Directives:

Directive	2012/19/EU	Waste electrical and electric equipment
Directive	2014/53/EU	Radio Equipment Directive (RED)
Directive	1999/519/EC	Limitation of exposure to electromagnetic fields (SAR)
Directive	2011/65/EU	RoHS and 2015/830/EU

Standards:

Emission:	EN 61000-6-3/A1:2011	Electromagnetic Compability Generic standards – Emission
Immunity:	EN 61000-6-2:2005 Draft EN 301489-1:2016 v2.1.0 EN 301489-17:2012 v2.2.1	Electromagnetic Compability Generic standards – Immunity
Laser:	EN 60825-1	Safety of laser products
Radio:	ETSI EN 300 328 v1.9.1,v2.1.1	Harmonized EN covering essential requirements of the R&TTE Directive
	ETSI EN 301 893 v1.8.1	Harmonized EN covering essential reqs
SAR:	EN 62209-2	Human exposure Wireless
Safety (Battery charger):	IEC 60950-1:2005+A1 EN 60950-1:2006+A11:2009+A1:2010+A2:2013+AC:2011+A12:2011	Information technology equipment
RoHS:	EN 50581:2012	Technical documentation

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Quality Assurance

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