User's manual
FLIR Thermal Studio
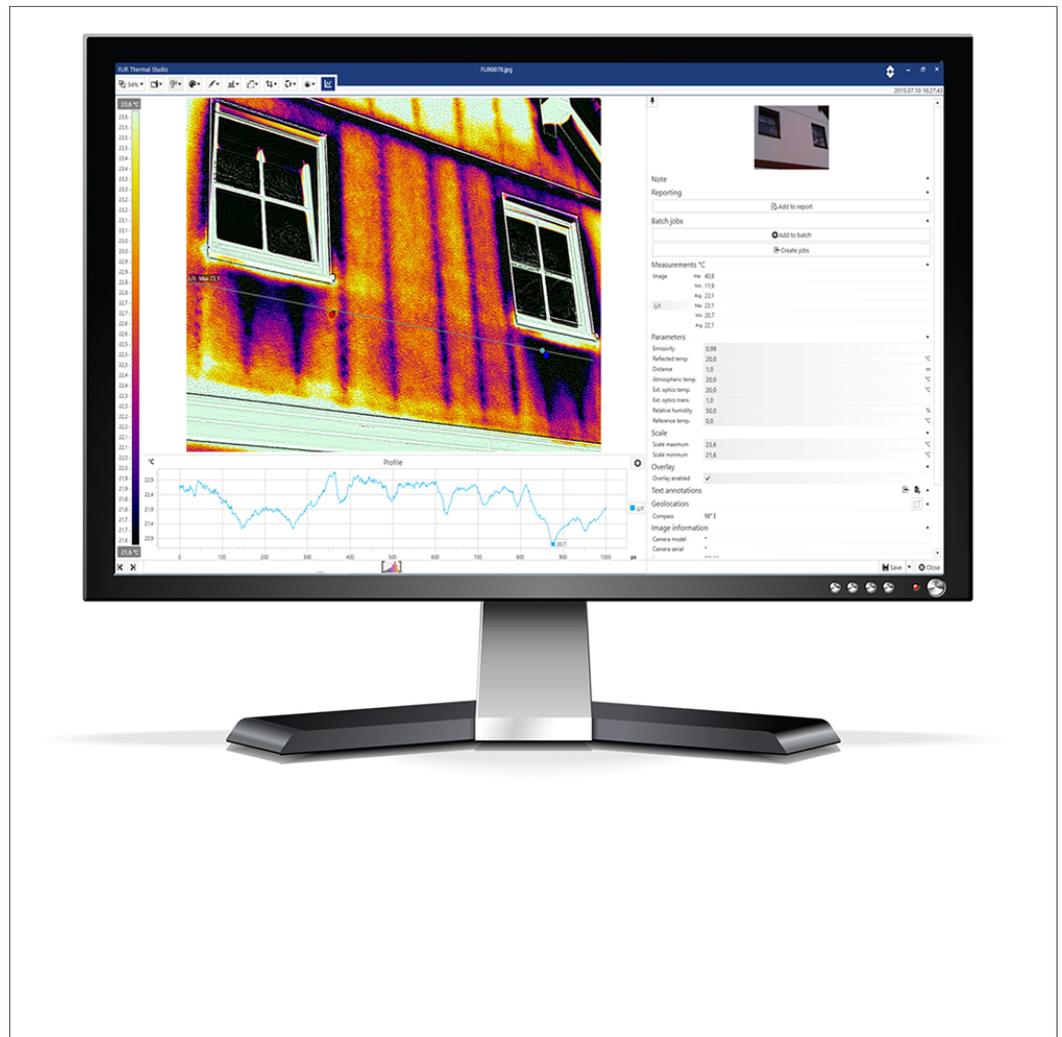
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1 Legal disclaimer

1.1 Legal disclaimer

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

1.2 Usage statistics

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

1.3 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.

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2   Notice to user

2.1   Online documentation

Our manuals are continuously updated and published online.

To access the latest FLIR Thermal Studio user manual, go to
https://support.flir.com/resources/5sfn/.

To access the latest releases of manuals for our other products, as well as manuals for
our historical and obsolete products, go to the Download tab at http://support.flir.com.

2.2   Customer support

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.

2.3   Training

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

2.4   Additional license information

For each purchased software license, the software may be installed, activated, and used
on two devices, e.g., one laptop computer for on-site data acquisition, and one desktop
computer for analysis in the office.

2.5   Software updates

FLIR Systems regularly issues software updates. Depending on the software, the loca-
tion of the update service will vary. Refer to the documentation of the software your are
using.

2.6   Note about generic manuals

FLIR Systems issues generic manuals that cover several software variants within a soft-
ware suite. This means that this manual may contain descriptions and explanations that
do not apply to your software variant.

2.7   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 imple-
mented in English.

3   Introduction

FLIR Thermal Studio is a powerful, flexible, and efficient software for creating thermal inspection reports and automation of editing tasks with large amounts of thermal images. The software supports images and videos in standard FLIR format from all modern FLIR thermography cameras, including the C-, T-, E- and GF-series, as well as FLIR One and the P6-series.

FLIR Thermal Studio provides features where the user can:

- **Use report templates**
  Instead of manually creating an inspection report, design your own template and include the information your need for this particular report. Working with templates makes the work easier especially when you handle a large number of images.

- **Customize overlay and palettes**
  Select what information you want to see in the image, for example measurements, emissivity, compass (when applicable), and date/time. Import palettes and apply colorization from other thermographers.

- **Correct thermal fusion alignment**
  Respond to any alignment issues caused by thermal cameras.

- **Use batch processing**
  Automate the tasks that need to be repeated for each thermal image such as normalization, modifying measurements, changing palettes, and customizing image overlay.

- **Automate data collection and reporting**
  Create routes you can download to an enabled FLIR T-Series camera as well as customize report templates.

3.1   Standard versus Pro

The table summarizes the limitations of the standard version of FLIR Thermal Studio compared to the more advanced FLIR Thermal Studio Pro.

	FLIR Thermal Studio standard
Reporting	Up to 5 custom templates
	No profile
	No histogram
	No formulas/formula editor
Image editor	No Magic Wand, no Polygon
Batch processing	Output target: Radiometric JPEG and Default Overlay
	Image presentation: Palette, Fusion Alignment, UltraMax Enhancement
	Scale: All (Minimum, Maximum, Set Auto Scale)
	Units: All (Temperature and Distance)
	Parameters: Emissivity and Distance
	Measurements: Spots (Minimum, Maximum), Clear All
Live streaming	No radiometric video recording, no Dual streaming (IR and visual))
Plug-ins	No support for plug-ins

4   Installation

This chapter describes the system requirements of the FLIR Thermal Studio application, and how the application is installed and activated.

4.1   System requirements

Operating system	Microsoft Windows 8 or higher.
	Thermal Studio 1.7 and higher versions support 64-bit, only.
Hardware requirements	• RAM: Minimum 4 GB • Disk space: Minimum 250 MB
Additional requirements	• .NET Framework 4.6 needs to be installed • Recommended screen resolution is 1024 × 768

4.2   Installation

Note   To complete the installation of FLIR Thermal Studio, the computer might need to be restarted. Follow the instructions.

To install FLIR Thermal Studio, follow this procedure:

1. Download the FLIR Thermal Studio Installer package from the product page, https://support.flir.com/thermalstudio.
2. To start the installation, double-click the executable file *FLIR_Thermal_Studio_ Installer*.
3. Read and accept the license terms and conditions of the End User Software License Agreement.
4. Click *Install*.
5. Click *Finish*.
6. Run the application from the Start menu or by double-clicking the desktop icon.
7. The FLIR Thermal Studio dialog box appears where you can activate your license key.

4.3   License activation

The first time you start FLIR Thermal Studio you will be prompted to activate your license key. Do this either as an *Online activation* (internet access) or as an *Offline activation* (no internet access).

4.3.1   Online activation

1. Run the application from the Start menu or by double-clicking the desktop icon. The FLIR Thermal Studio dialog box appears.
2. Click *Online activation*.
3. In the *Software license key* text box, type the license key obtained at the time of purchase.
4. Type your contact details in the *Customer name* and *Customer e-mail* text boxes.
5. Click *Validate*.
6. The activation is completed and FLIR Thermal Studio is started.

4.3.2   Offline activation

1. Run the application from the Start menu or by double-clicking the desktop icon. The FLIR Thermal Studio dialog box appears.
2. Click *Offline activation - no internet access*.
3. Copy the information in the *Machine identifier* text box.
4. Go to the FLIR Thermal Studio product page, https://support.flir.com/thermalstudio, and then click the link *Offline activation*, FLIR Thermal Studio.

5. Click the link of your preferred language.
6. Type your contact details in the *Name* and *E-mail* text boxes.
7. In the *Serial number* text box, type the license key obtained at the time of purchase.
8. In the *Machine code* text box, paste the *Machine identifier* that you copied in an earlier step (step 3 above).
9. Click *Request activation code*.
10. Copy the generated activation code that appears at the top of the page.
11. Return to the FLIR Thermal Studio dialog box, and then paste the copied activation code into the *Activation code* text box.
12. Click *Validate*.
13. The activation is completed and FLIR Thermal Studio is started.

4.4 Plug-in activation

Plug-ins are supported by FLIR Thermal Studio Pro.

1. Run the application from the Start menu or by double-clicking the desktop icon.
2. On the *Home* page toolbar, click *Settings*.
3. Select the *Plugins* tab.
4. To activate a plug-in, click *License*.
5. Enter your plug-in license key and click *Validate*.
6. To exit the *Settings* page, click *Close* in the bottom right corner of the page.

5 User interface

This chapter describes the available application pages in FLIR Thermal Studio. It also describes the different settings that can be configured.

5.1 Application pages

When the FLIR Thermal Studio application is started, the user is presented with tabs representing the *Home*, *Library*, *Reporting*, *Batch processing*, *Live*, and *Routing* pages.

5.1.1 Home

The *Home* page represents the start page of FLIR Thermal Studio. To the left you will find shortcuts to some of the available reporting and batch processing tasks. To the right you will find shortcuts to the most recent files that you have been working with. Note that the tasks and the files can also be accessed from the toolbars.

5.1.2 Library

The *Library* page shows the File Explorer of the computer your are working on. Here you can navigate to any folder where you have saved your thermal images, both locally on your computer and on any connected network shares.

When you click a folder, the images in that folder are presented in the center pane. When you click an image in the center pane, information about that image is shown in the pane to the right.

5.1.3 Reporting

The *Reporting* page is the page where you create your reports. Create them from scratch or by using templates.

5.1.4 Batch processing

The *Batch processing* page is the page where you create and run jobs in batches. Create a batch by selecting and combining the jobs in the *Job toolbox* pane to the left. Note that the jobs are also available in the toolbar.

5.1.5 Live

The *Live* page is the page where you can live stream and control USB connected cameras.

5.1.6 Routing

The *Routing* page is the page where you can build an asset list for routing and create inspection reports using an asset list.

The *Routing* functionality is available as a plug-in for FLIR Thermal Studio Pro. For information on how to activate the *Routing* plug-in, see 4.4 *Plug-in activation*.

5.2 Settings

Go to the *Settings* page to change, for example, settings for the user interface or how to manage updates of the FLIR Thermal Studio application. Note that some settings require a restart of the FLIR Thermal Studio application before a change goes into effect.

You access the *Settings* page via the toolbar on the *Home* page. To exit the *Settings* page, click *Close* in the bottom right corner of the page.

5.2.1 File explorer

Change file and preview options by using the *Show hidden files* and the *Folder previews* check boxes.

5.2.2   Output

Change the file path to the folder where you want to store the result files. Click *Browse* and then select the folder.

When the *Open output folder when done* check box is selected, the folder with the result files will open when the task is completed.

5.2.3   Reporting

Select the *Reporting options* and the *Default fonts* to be used in your reports.

5.2.4   Editor

Change the file path to the folder where your custom palettes are located. Click *Browse* and then select the folder.

5.2.5   Overlay-File Explorer and -Batch processing

Select if and how you want to use an image overlay when editing images manually in File Explorer and when running batch processing. When you select or deselect a check box in the list of settings, the result is immediately presented in the example image. Note that the *Overlay enabled* check box must be selected before the settings can be changed.

5.2.6   Regional settings

Select the language and units to be used in the user interface.

5.2.7   Updates

Select how you want to manage updates of the FLIR Thermal Studio application.

- *Check if updates are available* (check box)
  With this option enabled, a check for updates will automatically be performed every time the application is started.

- *Prompt to install updates*
  With this option enabled, the user will be asked to install any available updates if the *Check if updates are available* option is enabled.

- *Check if updates are available* (button)
  Click to manually check if any updates are available for download.

- *Proxy settings*
  If updates need to be downloaded via a proxy service, configuration is needed. In the *Proxy settings* dialog box, select the *Use proxy* check box, and then enter the requested information. Click *OK* to save.

5.2.8   Theme

Change the theme of the user interface.

5.2.9   Plugins

Plug-ins are supported by FLIR Thermal Studio Pro.

Click *License* to activate a plug-in. For more information, see 4.4 *Plug-in activation*.

5.2.10   General

Select the *Enable analytics* check box to collect data on how the FLIR Thermal Studio application is used. This data can be sent to FLIR for analysis and troubleshooting.

6   Reporting

This chapter describes the screen elements of the *Reporting* page.

6.1   General

The *Reporting* page is the page where you create your report. Create it from scratch or by using a template—either select one of the available templates or create a new one.

Reports are saved in the .atr (advanced thermal report) file format and report templates are saved in the .att (advanced thermal template) file format. Both formats can be exported to Adobe PDF or Microsoft XPS.

Note   When images are added to a report, copies of the images are made. This means, when changes are made to an image that has been added to a report, the original image stays unchanged.

6.2   Navigation

This image shows what the user interface looks like when you have selected to *Create blank report*. The user interface looks similar when you have selected to *Generate report using template* and selected the template, and then added the images.

1. Toolbar
    The toolbar includes options for creating, saving, exporting, and printing reports, and for editing the reports by inserting images and other items.

2. Image library
    Navigate to image files in folders both locally on your computer and on any connected network shares, and then insert them into the report. Use the icons at the bottom of the pane to change the size of the image icons, to add any selected image files to a report, or to add all image files in a selected folder to a report.

3. Pages
    See all pages included in the report. Use the icons at the bottom of the pane to add or remove pages. Change the order of the pages by right-clicking a page, and then clicking *Move up* or *Move down*.

4. Report workspace
This is the workspace where you create and edit the report. Use the toolbar to insert images, tables, plots, fields, thermal fields, and formulas into the report. To move the items around on a page, click and hold an item and then place it where you want it to go. Note the page navigation, the page zoom, and the *Visibility settings* like *Show ruler* and *Show mesh* at the bottom of the pane.

5. Properties and settings
Click an item in the report workspace to see and change settings such as position on the page (*Left* and *Top*) and image size (*Width* and *Height*). Click *Overlay...* to open the image in the overlay view and make changes for this particular image. When you select or deselect a check box in the list of settings, the result is immediately presented in the image. To close the overlay view and return to the *Reporting* page, click *OK* or *Cancel*.

7 Reporting templates

This chapter describes step by step how a reporting template is created and edited, in general. For details on how to add objects such as images, tables, plots, fields, thermal fields, and formulas to the template, refer to chapter 9 *Edit reports*.

7.1 General

The FLIR Thermal Studio application comes with a set of predefined reporting templates. If these templates do not meet your requirements, you can create your own custom templates.

7.2 Create a new reporting template

On the *Reporting* page:

1. Click *New*, and then click *Create a new reporting template*. A blank report page is added to the *Pages* pane.
2. Use the toolbar to insert images, tables, plots, fields, thermal fields, and formulas into the report.
3. To save the template, click *Save as template*.
4. In the dialog box that appears, type a name for the template, and then click *OK*. The template will now be visible in the *Available templates* list.

7.3 Edit a reporting template

On the *Reporting* page:

1. Click *New*, and then click *Generate report using template*. A page with the *Available templates* and *Template preview* panes appears.
2. In the *Available templates* pane, right-click the template you want to edit, and then click *Edit*. The template is opened.
3. Edit the template.
4. To save the changes, click *Save*.

8   Create reports

This chapter describes step by step how a report is created, in general. For details on how to add objects such as images, tables, plots, fields, thermal fields, and formulas to the report, refer to chapter 9 *Edit reports*.

8.1   Create a blank report

On the *Reporting* page:

1. Click *New*, and then click *Create blank report*. A blank report page is added to the *Pages* pane.
2. In the *Image library* pane, navigate to the folder where you have stored the images you want to create a report on.
3. Add the images:

    • To add a single image, click the image and then click *Add selected to report* (plus button).
    • To add multiple images, click the images while pressing the CTRL key on your keyboard, and then click the *Add selected to report* (plus button).
    • To add all images in the folder, click the *Add folder to report* (folder button).

    The selected images are added to the blank report.

4. Use the toolbar to insert images, tables, plots, fields, thermal fields, and formulas in the report.
5. To save the report, click *Save as report*.
6. In the *Save as* dialog, browse to the folder where you want to store the report, type a name for the report, and then click *Save*.

8.2   Generate a report using a template

On the *Reporting* page:

1. Click *New*, and then click *Generate report using template*. A page with the *Available templates* and *Template preview* panes appears.
2. Click the template you want to use, and then click *Select*.
3. In the *Image library* pane, navigate to the folder where you have stored the images you want to create a report on.
4. Add the images:

    • To add a single image, click the image and then click the *To report* (plus button), or drag the image to the *Pages* pane.
    • To add multiple images, click the images while pressing the CTRL key on your keyboard, and then click the *To report* (plus button), or drag the images to the *Pages* pane.
    • To add all images in the folder, click the *To report* (folder button).

    The selected images are added to the report template in the *Pages* pane.

5. Click *Next screen*.
6. Review the report.
7. To save the report, click *Save as report*.
8. In the *Save as* dialog, browse to the folder where you want to store the report, type a name for the report, and then click *Save*.

8.3   Generate a report using Rapid Report

With the Rapid Report functionality, you can create a shortcut to a FLIR Thermal Studio report on your computer desktop, and then drop images or a folder of images on the shortcut to create a report. You can create one or multiple Rapid Report shortcuts on your desktop.

On the *Reporting* page:

1. In the *Available templates* pane, right-click the template you want to create a shortcut to, and then click *Create RapidReport shortcut*. The *Shortcut created on desktop* message appears in the upper right corner of the page.
2. Navigate to the images (or to the folder of images) that you want to create a report on.
3. Drag the images (or the folder of images) and drop them on the newly created shortcut on the desktop. The *Open with FLIR Thermal Studio* message appears.
4. The report is created and then opened in FLIR Thermal Studio.

9 Edit reports

This chapter describes how to add objects such as images, tables, plots, and fields to the report. Note that these objects and the thermal images they refer to must be on the same page in the report. The exception is the *Summary table*, which is normally placed at the end of the report.

9.1 Images

Several types of images are available like *Thermogram* (thermal image), *Photo* (visual image), *Scale* (temperature), and *Shared image* (e.g., a logotype image).

9.1.1 Add an image

1. In the *Pages* pane, click the report page where the images are to be added.
2. Click *Thermogram*. A placeholder for a thermal image is added to the report page.
3. Click *Photo*. A placeholder for a visual image is added next to the placeholder for the thermal image.
4. In the *Image library* pane, click an image and drag it to the *Thermogram* placeholder. The corresponding visual image is shown in the visual image placeholder.
5. To verify that the visual image is referencing the correct thermal image, click the visual image (*Source*). Its *Reference* is then shown in the properties pane.

9.1.2 Add a temperature scale

By default, a temperature scale is visible in the thermal image. To add a scale and place it anywhere on the report page, follow this procedure:

1. In the report, click the thermal image for which a temperature scale is to be added.
2. Click *Scale*. A scale is added to the report page.
3. Click and hold the scale, and then move it into position.
4. To verify that the scale is referencing the correct thermal image, click the scale. Its *Reference* is then shown in the properties pane.

9.1.3 Remove or hide a temperature scale

To hide the temperature scale in the thermal image, follow this procedure:

1. In the report, click the thermal image with the scale to be hidden.
2. In the properties pane, deselect the *Show scale* check box.
3. To bring back the scale, select the *Show scale* check box.

To remove an added temperature scale, follow this procedure:

1. In the report, click the scale to be removed.
2. Right-click the scale, and then click *Remove*.

9.2 Tables

A table can show any type of information such as measurements, parameters, and camera information. Add a table and reference it to one of the thermal images on the report page. Modify the table by adding or removing table rows and columns, or by changing row and column order.

Several types of tables are available.

9.2.1 Add a table

1. In the report, click the image for which a table is to be added.
2. Click to insert the preferred type of table. The table is added to the report page.
3. Click and hold the table, and then move it into position.
4. To verify that the table is referencing the correct thermal image, click the table. Its *Reference* is then shown in the properties pane.

9.2.2 Remove a table

1. In the report, click the table to be removed.
2. Right-click anywhere in the table, and then click *Remove table*.

9.2.3 Add a table row

1. In the report, right-click anywhere in the table.
2. Click *Add row*, and then select which information to add.
   The new row is added at the bottom of the table.

9.2.4 Move a table row (change the row order)

1. In the report, click the table.
2. Right-click the row to be moved, and then click *Move up* or *Move down*.

9.2.5 Remove a table row

1. In the report, click the table.
2. Right-click the row to be removed, and then click *Remove row*.

9.2.6 Add a table column

Note Not available for all types of tables.

1. In the report, click the table.
2. In the table, right-click the column to the left of where you want to add the new
   column.
3. Click *Add column*, and then select which information to add.

9.2.7 Move a table column (change the column order)

Note Not available for all types of tables.

1. In the report, click the table.
2. Right-click the column to be moved, and then click *Move left* or *Move right*.

9.2.8 Remove a table column

Note Not available for all types of tables.

1. In the report, click the table.
2. Right-click the column to be removed, and then click *Remove column*.

9.3 Plots

Add a plot and reference it to one or more thermal images. Several types of plots are
available.

9.3.1 Add a plot (single thermal image)

1. In the report, click the thermal image for which a plot is to be added.
2. Click to insert the preferred type of plot. The plot is added to the report page.
3. Click and hold the plot, and then move it into position.
4. To verify that the plot is referencing the correct thermal image, click the plot. Its *Refer-
   ence* is then shown in the properties pane.

9.3.2 Add a plot (several thermal images)

1. In the report, click one of the thermal images for which a plot is to be added.
2. Click to insert the preferred type of plot. The plot is added to the report page.
3. Click and hold the plot, and then move it into position.
4. Click the plot. Settings for the plot are shown in the properties pane.
5. In the *Reference* list, click the check boxes of all images that you want the plot to
   reference.

9.3.3   Remove a plot

1. In the report, click the plot to be removed.
2. Right-click the plot, and then click *Remove*.

9.4   Fields

A field is a single object that can be placed anywhere in the report. Several types of fields are available.

9.4.1   Add a field

1. In the *Pages* pane, click the report page where the field is to be added.
2. Click to insert the preferred type of field. The field is added to the report page.
3. Click and hold the field, and then move it into position.
4. Click the field. Settings for the field are shown in the properties pane.

9.4.2   Remove a field

1. In the report, click the field to be removed.
2. Right-click the field, and then click *Remove*.

9.5   Thermal fields

A thermal field is a single object that can be placed anywhere in the report. Several types of thermal fields are available.

9.5.1   Add a text annotation field

1. In the report, click *Text annotation*. A dialog box appears.
2. In the text box, type a name of the text annotation field to be added, and then click *OK*. The field is added to the report page.
3. Click and hold the text annotation field, and then move it into position.
4. Click the text annotation field. Settings for the field are shown in the properties pane.
5. As an option, select the *Treat as title* check box to show the name of the field at the top of the field.

9.5.2   Add a measurement field

1. In the report, click *Measurement*. A dialog box appears.
2. In the dialog box, click the preferred *Selected measurement* and *Property* check boxes.
3. As an option, change the *Reference name* and *Property* check boxes, and then click *OK*. The field is added to the report page.
4. Click and hold the measurement field, and then move it into position.
5. Click the measurement field. Settings for the field are shown in the properties pane.
6. As an option, select the *Treat as title* check box to show the name of the field at the top of the field.

9.5.3   Add a sensor reading field

1. In the report, click *Sensor reading*. A dialog box appears.
2. In the text box, type the name of the sensor reading field to be added, and then click *OK*. The field is added to the report page.
3. Click and hold the sensor reading field, and then move it into position.
4. Click the sensor reading field. Settings for the field are shown in the properties pane.
5. As an option, select the *Treat as title* check box to show the name of the field at the top of the field.

9.5.4   Add a formula

1. In the report, click the thermal image for which a formula is to be inserted.

2. Click *Formula*. The formula field is added to the report page.
3. To verify that the formula is referencing the correct thermal image, click the formula field. Its *Reference* is then shown in the properties pane.
4. In the *Title* list, click the formula that you want to use for this field. The field content is updated according to selected formula.
5. Click and hold the formula field, and then move it into position.

9.5.5 Remove a thermal field

1. In the report, click the thermal field to be removed.
2. Right-click the field, and then click *Remove*.

10   Formula editor

This chapter describes how to create, import, and export formulas in the *Formula editor* of the FLIR Thermal Studio application. For more information, see the appendix *Working with formulas in FLIR Thermal Studio*.

10.1 General

By using formulas, the user can carry out advanced calculations in the reports based on information from the thermal images. A formula can include all mathematical operators and functions, and it is possible to export formulas from one report and then import them into another report.

The FLIR Thermal Studio application comes with a set of predefined formulas. If these formulas do not meet your requirements, you can create your own. Create them from scratch or use one of the predefined formula as a basis.

The formulas are created, edited, imported, and exported in the *Formula editor*.

10.2 Create a formula

On the *Reporting* page:

1. Click *Tools*, and then click *Formula editor*. A separate window appears.
2. Click *Create*. A formula named *Formula [X]* is created and listed in the *Stored formulas* list.
3. Click the new formula. The *Editor* section appears at the bottom of the window.
4. In the *Title* text box, type the name of the formula.
5. In the *Expression* text box, define the expression of the formula.
6. In the *Precision* text box, type the number of decimal places to be used for accuracy.
7. To save the formula, click *Save and exit*.

10.3 Import a formula

On the *Reporting* page:

1. Click *Tools*, and then click *Formula editor*. A separate window appears.
2. Click *Import*.
3. In the *Open* window, browse to the formula file (.json) that you want to import, and then click *Open*.
4. The imported formulas are listed in the *Stored formulas* list.

10.4 Export a formula

On the *Reporting* page:

1. Click *Tools*, and then click *Formula editor*. A separate window appears.
2. Click *Export*.
3. In the *Save as* window, browse to the folder were you want to store the exported formula file (.json), and then click *Save*.

10.5 Delete a formula

On the *Reporting* page:

1. Click *Tools*, and then click *Formula editor*. A separate window appears.
2. In the *Stored formulas* list, point to the formula to be deleted, and then click the trash bin that appears on the row. The formula is removed from the *Stored formulas* list.

10.6　Use predefined formulas

The following predefined formulas are available:

- Difference in temperature from first image
  The difference between the maximum temperature and the minimum temperature of the first thermal image on the current report page. The calculated temperature is shown in blue text.

- Difference in temperature from second image
  The difference between the maximum temperature and the minimum temperature of the second thermal image (Img2) on the current report page.

- Difference in temperature between two spotmeters
  The difference in temperature between spotmeter 1 (Sp1) and spotmeter 2 (Sp2) of the first thermal image (Img1) on the current report page.

- Difference in average temperature between boxes from two thermal images
  The difference in average temperature between box 1 (Bx1) of the first thermal image (Img1) and box 1 (Bx1) of the second thermal image (Img2) on the current report page.

- Default rating formula
  The formula compares the maximum temperature of box 1 (Bx1.Max) and the temperature of spotmeter 1 (Sp1). By using the temperature differences defined in the formula, one of the texts **Normal** (lime green text), **Investigate** (orange text), **Repair next time** (orange text), or **Repair immediately** (red text) will appear on the report page.

10.7　Reset the predefined formulas

The predefined formulas are editable. If you change (e.g., by mistake) and need to reset them, follow this procedure.

Note　Any custom formulas need to be removed. Make sure that you have exported them so that you can reimport them afterwards.

On the *Reporting* page:

1. Click *Tools*, and then click *Formula editor*. A separate window appears.
2. In the *Stored formulas* list, delete all listed formulas.
3. Click *Save and exit*.
4. On the *Reporting* page, click *Formula editor*.
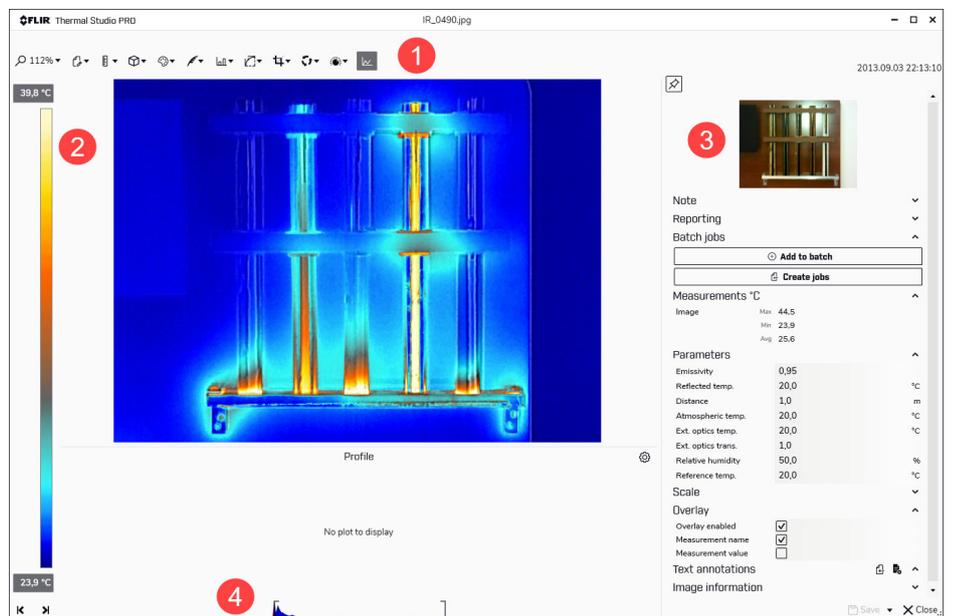5. The predefined formulas are now restored to the *Stored formulas* list.

11 Image editor

This chapter describes the screen elements of the image editor included in the FLIR Thermal Studio application.

11.1 General

The FLIR Thermal Studio application includes an embedded image editor where the user can edit thermal images and sequences (videos). To edit an image in a report, either double-click the image or right-click the image and then click *Edit*.

11.2 Navigation

This image shows what the image editor looks like when you have selected an image to edit.

1. Image editor toolbar
   The toolbar includes options such as zooming, adding measurements, changing palettes, and controlling isotherms and the color distribution. For more information on these features, see 12 *Edit images manually*.

2. Temperature scale
3. Properties pane
4. Temperature span and level control

11.3 Temperature span and levels

At the bottom of the infrared image you have two sliders. By dragging these sliders to the left or to the right, you can change the top and bottom levels of the temperature span. If you change the span to temperatures closer to the temperature of the object you are analyzing, it will be easier to analyze any temperature anomalies.

• To move the temperature span, click and hold the temperature span and then move it into position.
• To change the bottom and top levels of the temperature span, click and drag the left (bottom level) and the right (top level) sliders into position.

Note how the image changes as you move the span or sliders.

12   Edit images manually

This chapter describes how to use the embedded image editor included in the FLIR Thermal Studio application.

12.1   Measurement tool

You can add one or more measurement tools to the image, such as *Spotmeter*, *Rectangle*, and *Polygon*. Each measurement tool has its own settings, which are shown in the *Measurements* section of the properties pane.

12.1.1   Add a measurement tool

1. In the image editor, click *Add measurement*, and then click the preferred tool.
2. Move the tool pointer over the image and into position. Note that the pointer shows the temperature as it is moved around the image.
3. Click to place the tool in the image. Click to place the start point, drag the pointer to the desired size, and then click to place the end point. For the *Polygon* shape, click to place the start point, and then drag the pointer to the next point. Continue until you have the desired shape. Finish by right-clicking the shape.
4. Click the measurement tool. The properties for the tool are shown in the *Measurements* section of the properties pane.

12.1.2   Edit a measurement tool

To move the measurement tool, follow this procedure:

1. In the image editor, move the pointer to the center of the measurement tool.
2. Click and hold the measurement tool, and then move it into position.

To change size of the measurement tool, follow this procedure:

1. In the image editor, move the pointer to the outline of the measurement tool.
2. Click and hold the outline, and move it to the desired size and shape.

12.1.3   Change settings of a measurement tool

1. In the image editor, move the pointer to the center of the measurement tool.
2. Right-click the tool. A dialog box appears with the current settings of the tool.
3. Change the settings by selecting and deselecting the available check boxes. Any changes are immediately presented in the *Measurements* section of the properties pane.
4. To close the settings dialog box, click anywhere on the screen.

12.1.4   Delete a measurement tool

1. In the image editor, move the pointer to the measurement tool.
2. Right-click the tool, and then click *Remove*.

12.1.5   Use the *Magic wand*

Use the Magic wand to capture an area in the image based on pixel temperature. This is similar to the Polygon measurement tool but more advanced and easier to use when you want to capture and measure more complex shapes.

1. In the image editor, click *Add measurement*, and then click *Magic wand*.
2. Move the tool pointer over the image and into position. Note that the pointer shows the temperature as it is moved around the image.
3. Click to place the tool in the image. An area that has the same temperature as the selected point appears in the image.
4. In the *Measurements* section of the properties pane, move the *Tolerance* slider to adjust the area and include pixels that are close in temperature to the selected point.

12.1.6 Export to a csv file

Use the *Export to csv* functionality to export detailed temperature information. The export will include the temperature values of every pixel within the selected measurement tool.

1. In the image editor, right-click the measurement tool. A dialog box appears with the current settings of the tool.
2. Click *Export to csv*.
3. In the *Save as* dialog, browse to the folder where you want to store the exported file, and then click *Save*.

12.1.7 Use coverage

Use the *Coverage* functionality to see, as a percentage, the number of pixels in the image that are above or below a certain temperature.

1. In the image editor, right-click the measurement tool. A dialog box appears with the current settings of the tool.
2. Click the *Use coverage* check box. Use the *Above* and *Below* boxes to change the temperature. Any changes are immediately presented in the *Measurements* section of the properties pane.
3. To close the settings dialog box, click anywhere on the screen.

12.2 Palette

You can change the palette that is used to display the temperatures within an image. A different palette can make it easier to analyze the image. The FLIR Thermal Studio application comes with a set of predefined palettes, but custom palettes can also be used.

To change the palette, follow this procedure:

1. In the image editor, click *Select palette*.
2. Select one of the predefined palettes, or click *From file* to select a custom palette.

To export a palette, follow this procedure:

1. In the image editor, click *Select palette*.
2. Click *Export palette*.
3. In the *Save as* dialog, browse to the folder where you want to store the exported palette, and then click *Save*.

12.3 Isotherms control

Use the isotherm tool to apply a contrasting color to all pixels with a temperature *Above* or *Below* a certain temperature, or within a certain temperature *Interval*. Using isotherms is a good method to easily discover anomalies in a thermal image.

To add an isotherm, follow this procedure:

1. In the image editor, click *Isotherms control*.
2. Select one of the options *Above*, *Interval*, or *Below*.
3. Select a color that will be applied to the areas that meet the temperature settings.
4. In the *Isotherms* section of the properties pane, either set the temperature *Limit* for the *Above* and *Below* options, or set the *High* and *Low* temperatures for the *Interval* option.

12.4 Color distribution

Use the *Color distribution* option to change the distribution of colors in the image. A different color distribution can make it easier to analyze the image more thoroughly. The following distributions are available:

- *Histogram equalization*

The color information is distributed over the existing temperatures of the image. This method of distributing the information is especially successful when the image contains few peaks at very high temperature values.

- *Signal linear*
  The color information in the image is distributed linearly with respect to the signal values of the pixels.

- *Temperature linear*
  The color information in the image is distributed linearly with respect to the temperature values of the pixels.

- *Digital Detail Enhancement* (DDE)
  The high-frequency content in the image, such as edges and corners, are enhanced to increase the visibility of details.

To change the color distribution, follow this procedure:

1. In the image editor, click *Color distribution*.
2. Click one of the available color distributions.

12.5   Auto-adjust control

When you auto-adjust a thermal image, you adjust it for the best image brightness and contrast. This means that the color information is distributed over the existing temperatures of the image.

In some situations the image may contain very hot or very cold areas outside your area of interest. In such cases you might want to exclude those areas and use the color information only for the temperatures in your area of interest. You can do so by defining an auto-adjust region. Note that the defined regions will not be saved in the image.

To auto-adjust an image, follow this procedure:

1. In the image editor, click *Auto-adjust control*.
2. Select the *Enable scale auto-adjust* check box.

To define an auto-adjust region, follow this procedure:

1. In the image editor, click *Auto-adjust control*.
2. Select the *Enable scale auto-adjust using defined rectangle* check box. A dotted rectangle is added to the image.
3. Move and change the size of the rectangle to suit your area of interest. Note how the image changes as you make your changes.
4. To exit, click one of the icons in the bottom right corner of the rectangle:

   - To confirm the change, click the check mark.
   - To cancel the change, click the cross.

12.6   Crop an image

Use the *Crop image* option to trim the image. Provided that the cropped image has not been saved, it is possible to revert to the original image size.

To crop an image, follow this procedure:

1. In the image editor, click *Crop image*.
2. Select the *Show crop rectangle* check box. A dotted rectangle is added to the center of the image.
3. Move the pointer to the outline of the rectangle; to either one of the sides or one of the corners.
4. Click and hold the outline, and then change the shape of the rectangle to the desired size.

5. To exit, click one of the icons in the bottom right corner of the rectangle:

    - To confirm the change, click the check mark.
    - To cancel the change, click the cross.

To revert to the uncropped image, follow this procedure:

1. In the image editor, click *Crop image*.
2. Click *Reset image*.

12.7   Image rotation

To rotate an image, follow this procedure:

1. In the image editor, click *Image rotation*.
2. Move the *Image rotation* slider to rotate the image to the desired angle, or click one of the available predefined angles.
    As an alternative, type the desired angle in the *Angle* text box.

12.8   Fusion mode

Use the *Fusion mode* feature to mix a visual image with its corresponding thermal image. The following fusion modes are available:

- *MSX* (Multi Spectral Dynamic Imaging)
  Displays a thermal image where the edges of the objects are enhanced. The thermal–visual balance can be adjusted.

- *Thermal only*
  Displays a fully thermal image.

- *Thermal fusion*
  Displays a visual image with some parts displayed as a thermal image, depending on the temperature limits.

- *Blending*
  Displays a blended image that uses a mix of thermal image pixels and visual image pixels. The thermal–visual balance can be adjusted.

- *Picture in picture*
  Displays a thermal image frame on top of a visual image.

- *Visual only*
  Displays a fully visual image.

To set the fusion mode, follow this procedure:

1. In the image editor, click *Fusion mode*.

2. Select the preferred fusion mode.
    Note that some of the modes have additional settings:

    MSX

    *   Move the *Alpha* slider to show more or fewer contours in the image.
    *   If necessary, select the *Adjust fusion alignment* check box to manually align the images.

    Thermal fusion

    *   If necessary, select the *Adjust fusion alignment* check box to manually align the images.
    *   Select *Color mode* of the visual image; either *Color* or *Black and white*.

    Blending

    *   Move the *Blending level* slider to change the proportions of the thermal image and the visual image.
    *   If necessary, select the *Adjust fusion alignment* check box to manually align the images.
    *   Select *Color mode* of the visual image; either *Color* or *Black and white*.

    Picture in picture

    *   Select the *Use blending* check box, and then move the *Blending level* slider to change the proportions of the thermal image and the visual image.
    *   Select the *Adjust picture-in-picture rectangle* to provide an option to move the rectangle or change its size.
    *   If necessary, select the *Adjust fusion alignment* check box to manually align the images.
    *   Select *Color mode* of the visual image; either *Color* or *Black and white*.

    Visual only

    *   Select *Color mode* of the visual image; either *Color* or *Black and white*.

12.9   Show a profile plot

The plot shows the temperature profile along a drawn measurement line in the image.

1. In the image editor, click *Show profile plot*. An empty plot is added under the image.
2. In the image editor, click *Add measurement*, and then click *Line*.
3. In the image, draw a measurement line of interest. The plot now shows the temperature profile along the drawn measurement line.
4. If necessary, click the end points of the line and move them into new positions. Note how the profile plot changes as you change the position of the line.
5. To change the temperature unit (Celsius, Fahrenheit, or Kelvin) or color of the plot, click *Settings* (the icon is located to the right of the plot).

13 Batch processing

This chapter describes the screen elements of the *Batch processing* page.

13.1 General

The *Batch processing* page is the page where you create and run batches of jobs. Use the batch processing feature for automation of repetitive tasks when editing and normalizing thermal images. Operations that can be automated are, for example:

- Set parameters.
- Change settings.
- Modify measurements.
- Apply isotherms.
- Change the palette.
- Add a logo.

When processing batches of jobs, the following outputs are available:

- Radiometric images (.jpeg) for further processing.
- Plain overlay images for sharing online or with customers.
- Transcoder from a radiometric sequence to an AVI video file.
- Radiometric data exported to CSV files.

Go to *Settings* to configure if and how you want to use an image overlay for batch processing.
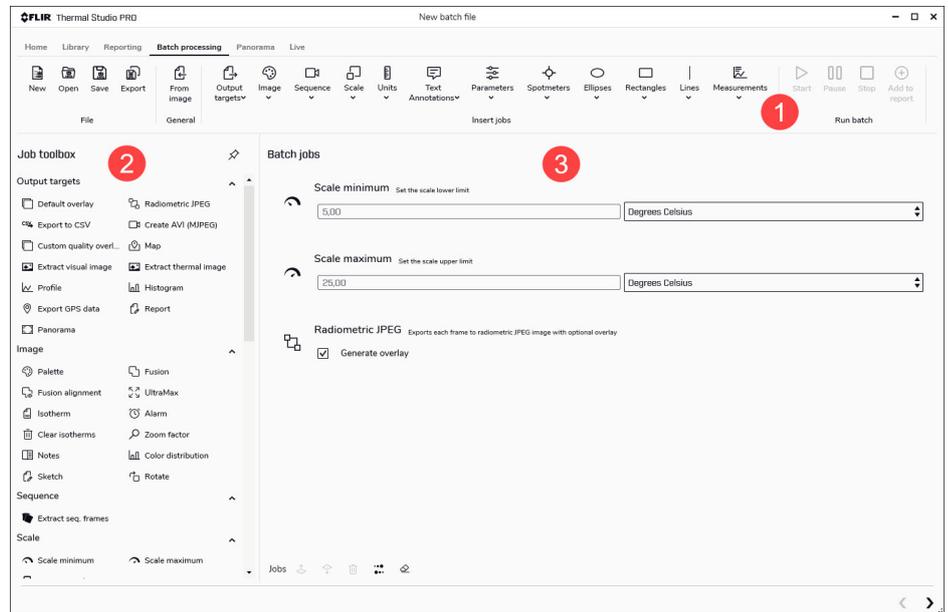
Batch jobs are saved in the .atb (advanced thermal batch) file format.

13.2 Navigation

The FLIR Thermal Studio application guides the user through the batch processing steps, which can be summarized as:

- Select which jobs to run.
- Place the jobs in the correct order, and set values where applicable.
- Select which images to be processed in the batch.
- Place the images in the correct order.
- Start processing.

This image shows what the user interface looks like when you have selected to run the predefined batch *Normalize temperature scale*.

1. Toolbar
   The toolbar includes options for creating, opening, saving, and exporting batches, and for selecting and adding available jobs to a batch. The jobs are grouped in menus, such as the *Output targets*, *Image*, and *Parameters* menus.

2. *Job toolbox*
   The toolbox lists all the jobs that can be run in a batch. The jobs are grouped into categories, such as the *Output targets*, *Image*, and *Parameters* categories.

3. *Batch jobs* workspace
   This is the workspace where you create the batch by adding jobs and setting values. As more jobs are added, a batch execution list is created.

   A new job is normally added at the end of list. Use the icons at the bottom of the pane to move the jobs up or down the list, to reverse the execution order of the jobs, to remove jobs from the list, or to clear the list of all jobs.

Note   All jobs can be selected from both the *Insert jobs* toolbar and from the *Job toolbox*.

13.3   Predefined batches

The FLIR Thermal Studio application comes with a set of predefined batches of jobs:

• *Create video from images*.
• *Normalize temperature scale*.

The batches are accessed from the *Home* page.

14 Work with batches

14.1   Start a new batch

On the *Batch processing* page:

1. Click *New*.
2. In the *Job toolbox* pane, click the jobs you want to add to the batch. Point to a job to see a short description. The jobs are added to the *Batch jobs* workspace pane.
3. Use the icons at the bottom of the pane to:

   - Move a selected job up or down the list.
   - Remove a selected job from the list.
   - Reverse the order of the selected jobs.
   - Remove all jobs and clear the list.

4. Verify that you have added an *Output target* job as the last job in the batch.

   Note   At least one *Output target* job must be run in the batch. If no output target has been selected, the job *Radiometric JPEG* will be added automatically and run as the last job in the batch.

5. Click *Next screen*.
6. In the *Image library* pane, navigate to the folder where you have stored the images you want to run the batch on.
7. Add the images:

   - To add a single image, click the image and then click *To batch* (plus button).
   - To add multiple images, click the images while pressing the CTRL key on your keyboard, and then click *To batch* (plus button).
   - To add all images in the folder, click *To batch* (folder button).

   The selected images are added to the *Batch files* pane.

8. Use the icons at the bottom of the pane to:

   - Move a selected file up or down the list.
   - Remove a selected file from the list.
   - Sort the files by name, or by date and time.
   - Reverse the order of the selected files.
   - Remove all files and clear the list.

9. Click *Next screen*.
10. To make changes to the overlay settings or to change the output folder, click *Settings*.
11. To run the batch, click *Start processing*.
12. The output files are shown in the *Processed files* pane. If the *Open output folder when done* check box is selected in *Settings*, File Explorer will also open and show the output files in the defined output folder.
13. To take a closer look at a result file and edit it if necessary, right-click the file in the *Processed files* pane, and then click *Edit*.
    The image is opened in the image editor. For more information, see 12 *Edit images manually*.

Note   If you conduct two consecutive runs of the same batch, the *Start processing* icon will not be displayed to start the second run. Instead, click *Start batch execution* in the toolbar.

14.2   Save a batch as a template

Create a batch and save it as a template to be used at a later time.

On the *Batch processing* page:

1. Click *New*.
2. In the *Job toolbox* pane, click the jobs you want to add to the batch. Point to the job to see a short description of it. The jobs are added to the *Batch jobs* pane.

3. Use the icons at the bottom of the pane to:

   • Move a selected job up or down in the list.
   • Remove a selected job from the list.
   • Reverse the order of the selected jobs.
   • Remove all jobs and clear the list.

4. Verify that you have added an *Output target* job as the last job in the batch.

   Note   At least one *Output target* job must be run in the batch. If no output target has been selected, the job *Radiometric JPEG* will be added automatically and run as the last job in the batch.

5. Click *Export*.
6. In the *Save as* dialog, browse to the folder where you want to store the batch template, type a name for it, and then click *Save*.

14.3   Open a saved batch

To open a previously created and saved batch template, follow this procedure:

1. On the *Batch processing* page, click *Open*.
2. In the *Open* dialog, browse to the folder where you have saved the batch template.
3. Click the batch template, and then click *Open*.
   The jobs included in the batch are listed in the *Batch jobs* workspace pane.

14.4   Create videos from images

Use the predefined batch *Create videos from images* to create a video (MJPEG format) from a number of thermal images:

1. On the *Home* page, click *Create video from images*.
2. On the *Batch processing* page, click *Next screen*.
3. In the *Image library* pane, navigate to the folder where you have stored the images you want to create a video of.
4. Add the images:

   • To add a single image, click the image and then click *To batch* (plus button).
   • To add multiple images, click the images while pressing the CTRL key on your keyboard, and then click *To batch* (plus button).
   • To add all images in the folder, click *To batch* (folder button).

   The selected images are added to the *Batch files* pane.

5. Use the icons at the bottom of the pane to:

   • Move a selected file up or down the list.
   • Remove a selected file from the list.
   • Sort the files by name, or by date and time.
   • Reverse the order of the selected files.
   • Remove all files and clear the list.

6. Click *Next screen*.
7. To make changes to the overlay settings or to change the output folder, click *Settings*.
8. To run the batch, click *Start processing*.
9. The output video file is shown in the *Processed files* pane. If the *Open output folder when done* check box is selected in *Settings*, File Explorer will also open and show the output video file in the defined output folder.

15 Panorama

This chapter describes how to use the *Panorama* functionality, supported in FLIR Thermal Studio Pro.

15.1 General

Use the *Panorama* functionality to stitch a sequence of thermal images together into one single panoramic image.

Note

- The sequence of image files used as input must come from the same recording.
- The order of the image files in the sequence is not important.
- Only one panoramic image can be created at a time. If you select image files from multiple sequences as input, only the images of the first selected sequence will be processed.

The *Panorama* functionality is also available as a job on the *Batch processing* page.

15.2 Create a panoramic image

On the *Panorama* page:

1. In the *Image library* pane, navigate to the folder where you have stored the images you want to create a panoramic image of.
2. Select a sequence of thermal images by doing one of the following:

    - Click a folder of images, and then drag the folder to the *Input files* pane.
    - Click individual images in the folder while pressing the CTRL key on your keyboard, and then drag the images to the *Input files* pane.

3. Click *Next screen*.
4. Click *Create panorama*.
5. The output panoramic image is shown.
6. Optionally, change zoom, change palette, crop, or rotate the panoramic image.
7. Save the image.

16 Live

This chapter describes how to live stream, record radiometric video, and control USB connected cameras.

16.1 Connect camera

1. Turn on the camera.
2. Connect the camera to the computer with a USB cable.
3. On the *Live* page toolbar, click *Connect*. This displays the live image stream from the camera.

16.2 Control camera

On the *Live* page, you can do the following:

• Calibrate the camera.
• Autofocus.
• Adjust the focus manually.
• Record radiometric video.
• Save a snapshot.

17   Routing

This chapter describes the FLIR Inspection Route solution in general and how to create inspection routes and inspection route reports on the *Routing* page.

Note The *Routing* functionality is available as a plug-in for FLIR Thermal Studio Pro. For information on how to activate the *Routing* plug-in, see 4.4 *Plug-in activation*.

17.1   FLIR Inspection Route

FLIR Inspection Route is a solution that streamlines thermal inspections and simplifies data collection and reporting. The solution includes FLIR software and camera support for preparation, inspection, and post-processing.

A camera that has Inspection Route enabled guides the operator along a predefined route of inspection points, where images and data are collected in a structured manner. FLIR Inspection Route speeds up post-processing and reporting by ensuring that nothing is missed and that all inspection results are organized right from the start.

The inspection work flow is defined by an inspection route file, with a high degree of flexibility. It is possible to configure an automated work flow, where the camera automatically sets the status and steps to the next inspection point when an image is saved. The operator can also manually select the status, add comments, and add more images and videos.

The inspection route work flow typically involves the following steps:

1. Prepare the inspection route file, using one of the following methods:

    • FLIR Thermal Studio Pro or other FLIR thermography software that has inspection route support.
    • Your own solution. The FLIR Thermal SDK can be used to build your own export/ import software or to interface your existing asset management system.
    • Create a file in the camera.
    • Manually edit a file.

2. Put the inspection route file prepared as above onto a memory card.
3. Insert the memory card into a FLIR camera that has Inspection Route enabled.
4. Perform the inspection using the camera.
5. Import the results into FLIR Thermal Studio Pro, other FLIR thermography software, or your own image management and reporting system.
6. Create an inspection route report.

17.2   Create inspection routes
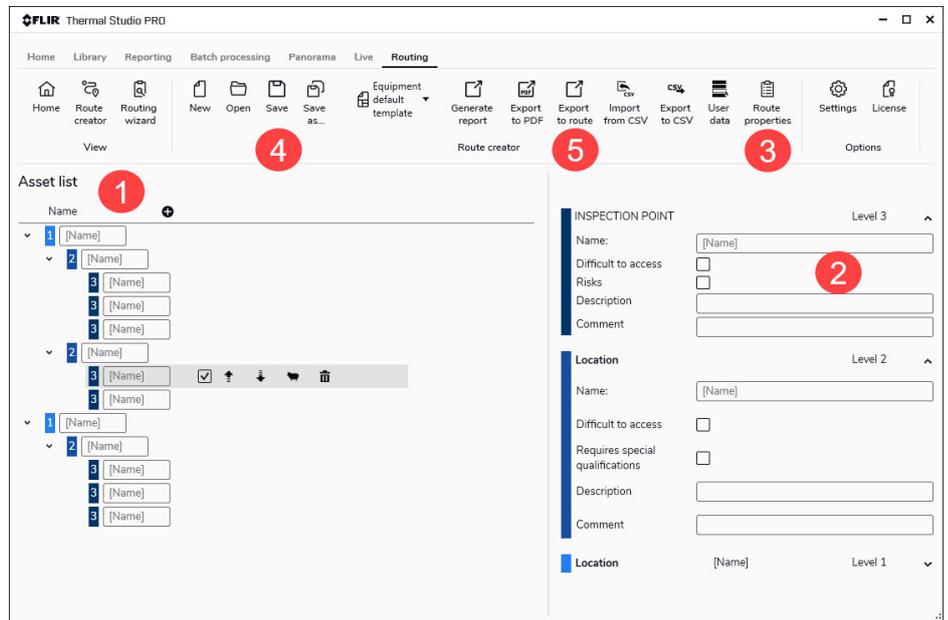
17.2.1   General

The inspection route is defined by an XML file. The inspection route XML file specifies the route structure, consisting of multiple levels of locations, assets, and inspection points. The inspection route file also defines the statuses that can be set for an inspection point during the inspection and the configuration of the camera behavior.

You create the inspection route file by using the *Route creator* on the *Routing* page. The procedure can be summarized as:

1. Build an asset list.
2. Define the route properties (statuses and camera behavior).
3. Save the asset list.
4. Export the inspection route to an XML file.

17.2.2   Navigation

This image shows what the user interface looks like when some locations, assets, and inspection points have been added in the *Route creator*.

1. **Asset list workspace**
   This is the workspace where you build the asset list. Use the plus button to insert locations at Level 1. Use the item toolbars to move, duplicate, add, and delete locations, assets, and inspection points. Select the *Include asset* check box to include the item when exporting the route or generating a report.

2. **Asset properties**
   Click an item in the asset list workspace to see and change its properties. All properties will be included in the inspection reports. The *Name*, *Description*, and *Comment* properties will be exported to the inspection route XML file and will be displayed in the camera user interface.

3. **Route properties**
   Click this option to open a window where you can define the statuses and the camera behavior. All route properties will be exported to the inspection route XML file and will be applied in the camera user interface. The defined statuses will be saved to the asset list file (*.act) and will be available when creating a report based on the saved asset list.

   Auto next: This setting defines if the camera after saving an image automatically will set the default status and step to the next inspection point. If most inspection points will have the default status, you will save inspection time by selecting the check box. If you often want to set the status or add comments to the inspection points, it may be more convenient to deselect the check box.

   Require image: This setting defines if the operator must save an image before it is possible to set the status of an inspection point.

   Delete empty assets: This setting defines if all empty inspection points (no image and no status) will be removed from the inspection route file when the operator locks an inspection.

4. **Save**
   Save the asset list in the .act (asset creator template) file format. You can use a saved asset list as basis when creating a new inspection route. You can also use a saved asset list to create a blank inspection route report and manually add data and images.

5. **Export to route**
   Export the inspection route to an .xml file. Transfer the exported .xml file to a camera and perform an inspection.

17.3   Create inspection route reports

17.3.1   General

With the *Routing wizard* on the *Routing* page you can do the following:
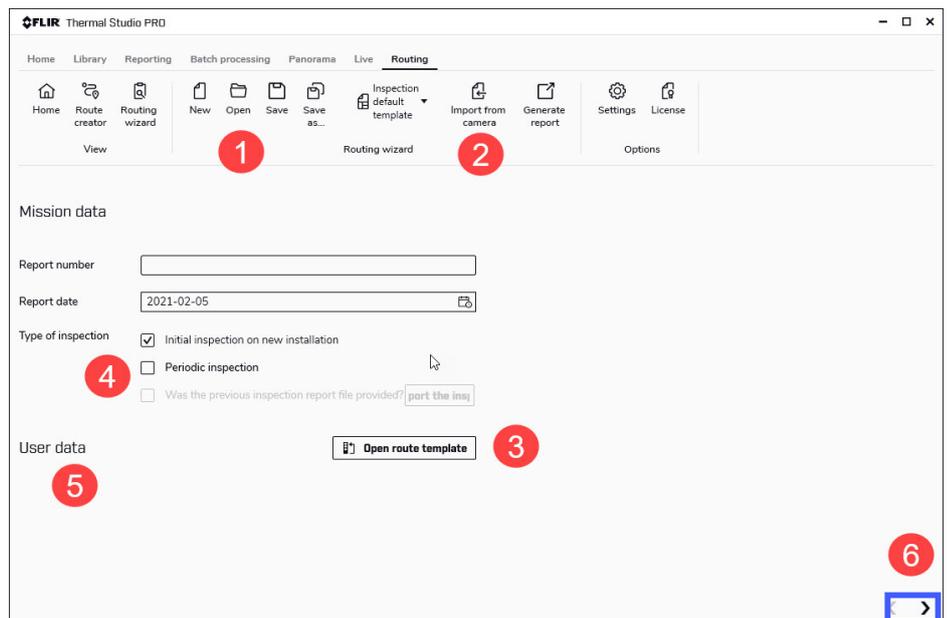
- Import an inspection route from the camera. The inspection data and images will automatically populate the asset list.
- Create a blank inspection route report using a saved asset list as template. You can add data and images manually.
- Open a saved inspection route report and continue working with the report.

Inspection route reports are saved in the .aws (asset wizard session) file format. When the report is completed in the *Routing wizard*, a report is generated in the .atr (advanced thermal report) file format. This means that you can modify the report using all the functions on the *Routing* page.

Note   When images are added to an inspection route report, copies of the images are made. This means, when changes are made to an image that has been added to a report, the original image stays unchanged.

17.3.2   Navigation

This image shows what the user interface looks like on the first page of the *Routing wizard*.

1. Open
   Open an inspection route file (.xml) or an inspection route report (.aws).

2. Import from camera
   Import an inspection route, including all images and inspection data, from the memory card of the camera. First connect the camera to the computer as an external USB disk or insert the memory card into the computer. Then click *Import from camera* and select the inspection route file (.xml) from the disk, memory card, or computer.

3. Open route template
   Create a blank inspection route report, using an asset list file (.act) or an inspection route file (.xml) as template.

4. Type of inspection
You can compare the report with a previous inspection report. The two reports must be based on the same inspection route file (.xml) or asset list file (.act). To import a previous report, select *Periodic inspection > Was the previous inspection report file provided? > Import the inspection*.
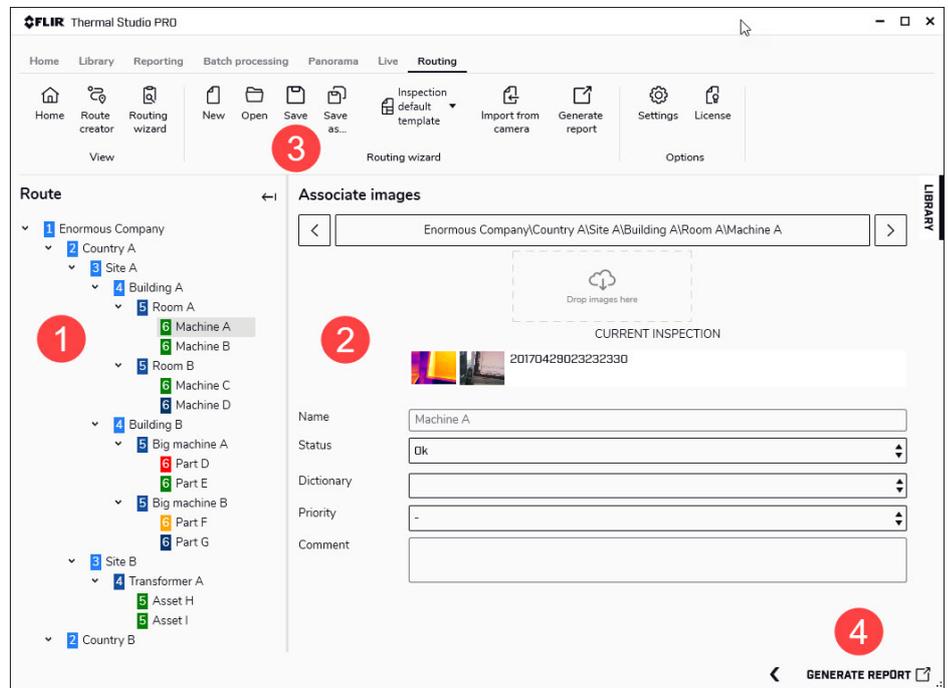
5. User data
When you have opened an inspection route, any available user data will automatically be displayed. There will also be icons you can use to add, import, export, and delete user data.

6. Next
Click the *Next* button at the bottom to continue to the next wizard page.

This image shows what the user interface looks like on the second page of the *Routing wizard*, when an inspection route with images and data has been opened.

1. Asset list
Navigate to locations, assets, and inspection points in the asset list.

2. Associate images workspace
This is the workspace where you can edit the report. Click an item in the asset list to see and edit its data and images. To open the image editor, double-click the image. To insert an image, drag-and-drop the image from the image library. To edit the text annotation dictionary, click the toolbar option *Settings*.

3. Save
Save the inspection route report in the .aws file format.

4. Generate report
Generate the inspection route report in the .atr file format. When the processing is completed, the program will open the inspection route report on the *Reporting* page.

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