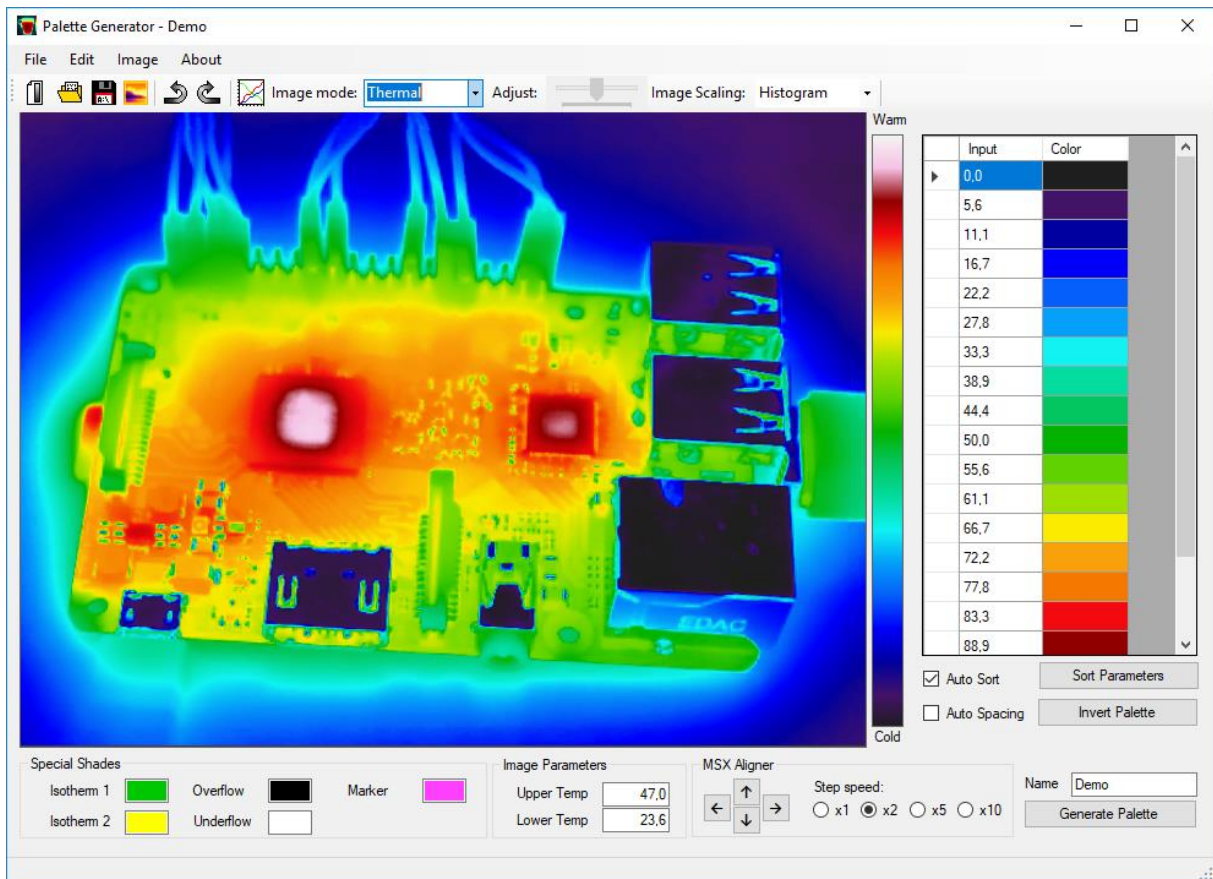


Palette Generator

User manual

Software version 1.1

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FLIR

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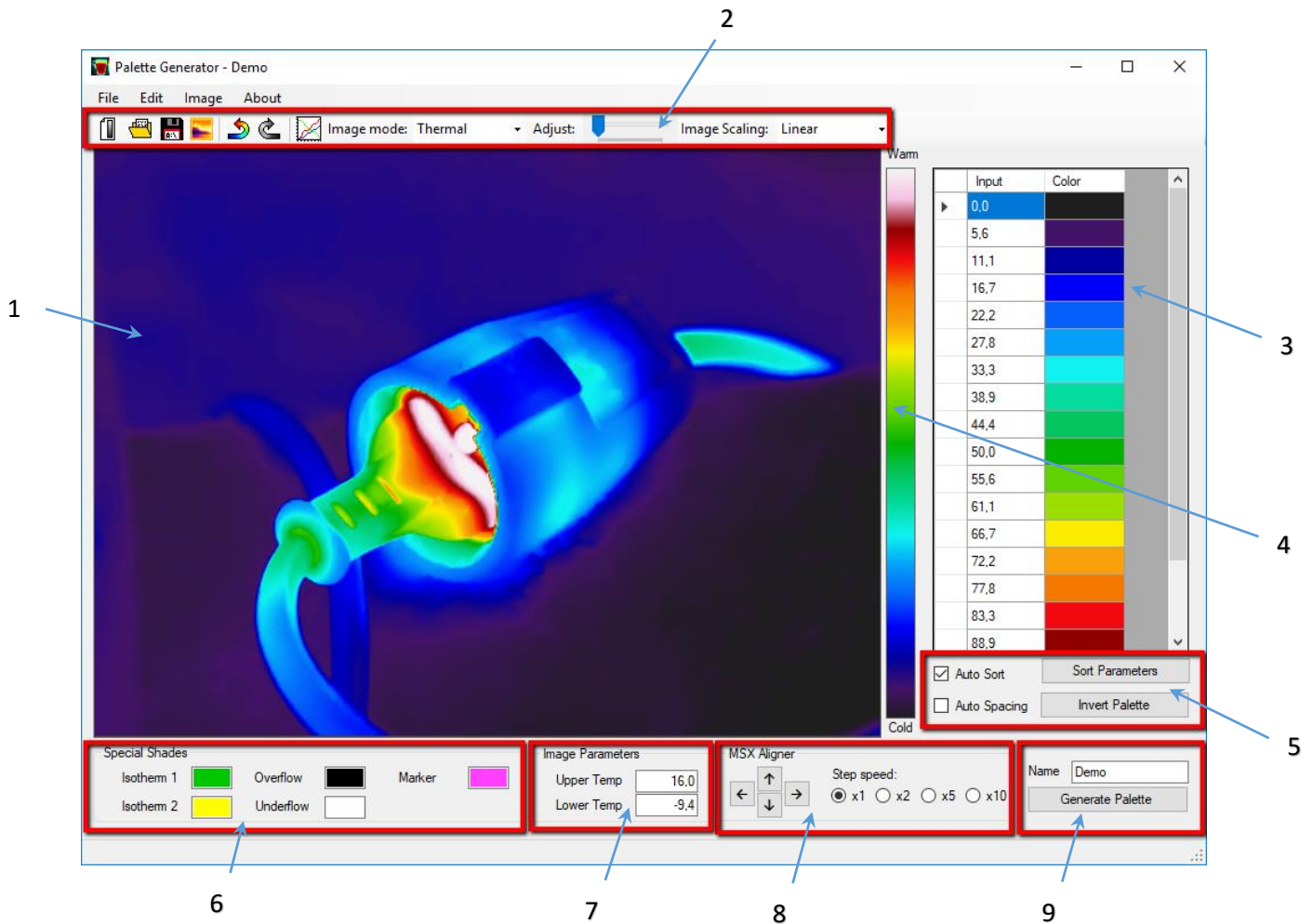
2 Introduction

The Palette Generator is a free tool for creating color palettes that can be used in FLIR Tools. The program displays changes to the palette live when values is changed, added and deleted to give full control on the color palette. Basically the Palette Generator linearizes the input value into three channels (Red, Green and Blue) which converts the monochrome temperature into colors. When palette is generated, the linearization creates a table of RGB colors ranging from 0 to 100% range of scaled temperature in image and saves it into FLIR Systems palette folder.

3 License agreement

This program is a freeware and to be used “as is” by anyone. This program can be used in any situation, but is not to be sold or been charged for. Developer of this program is not to be claimed for any missing functions, errors or any problems that may occur when using this software. If problems occur, please report issues according to section 8 Error Reporting. If disapproval of these terms, do not use this program. The license agreement can be changed by software creator.

4 Color Palette Overview



Description of items in picture:

Item	Name	Description
1	Thermal image	Displays thermal image with palette
2	Radiometric Image Settings and basic functions	Adjustments and modes adjustment for radiometric images and basic functions as Save, New, Open, Undo/Redo and Graph Editor
3	Parameter list	Color palette parameters defining the palette.
4	Color bar	Shows the palette ranging from cold to warm (0-100%).
5	Parameter list sorting	Sorts the parameter list.
6	Special Shades	Colors for special shades.
7	Image Parameters	Sets the image temperature range.
8	MSX Aligner	Tool to align the MSX Overlay
9	Generate Palette	Creates the palette file and saves into FLIRs palette folder.

5 Working with Palette Generator

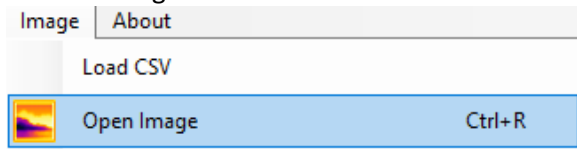
This section will describe the functionality of Palette Generator and how to create the palettes.

5.1 Open radiometric image

Radiometric images shot from a FLIR camera can be opened to visualize the color palette. This helps to create special tailored palettes for certain images. A radiometric image is a thermal image containing radiometric parameters to calculate temperature from the image.

Click the open image icon  or open it from the image menu:

1. Click on Image -> Load Radiometric JPEG



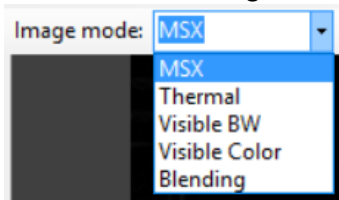
2. Browse to the radiometric image file and click Load.

5.2 Select radiometric image mode

The radiometric image can contain visual image, thermal image, MSX and a mix. The following modes is available in Palette Generator:

- MSX (Outlining contrast lines from the visual image into the thermal image)
- Thermal (Image generated by the temperature values in the image)
- Visual BW (Visual image in black & white)
- Visual Color (Visual image in color)
- Blending (Visual image with a transparent thermal image layer)

The radiometric image mode can be changed from the **Image Mode** combo box.



5.3 Adjust radiometric image mode influence

Some radiometric image modes can be adjusted. This applies for MSX and Blending modes. The amount of the filter influence on the image is adjusted by dragging the slider.

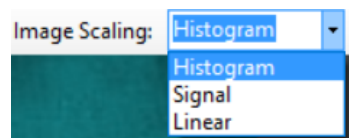


5.4 Select radiometric image scaling mode

The radiometric image can be set to the following scaling modes:

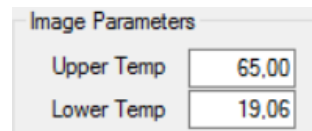
- Histogram (Image thermal colors distributed from the histogram)
- Signal (Colors linearized according to sensor raw signal values)
- Linear (Colors linearized according to temperature values)

The radiometric image scaling mode can be changed from the **Image Scaling** combo box.

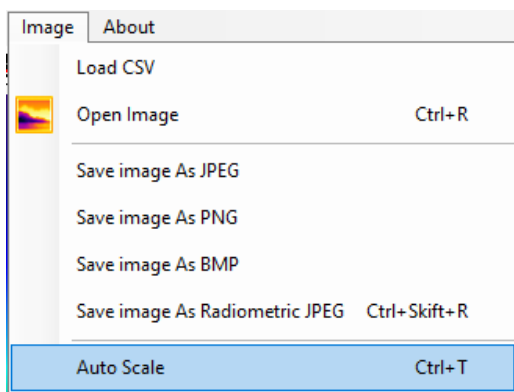


5.5 Radiometric image thermal range

The visible temperature range in an opened radiometric image, can be adjusted by setting the upper and lower temperature range in degrees. The temperature will be adjusted according to saved thermal unit.



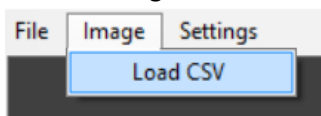
To automatically set the upper and lower thermal range according to image range, Select **Image -> Auto Scale**.



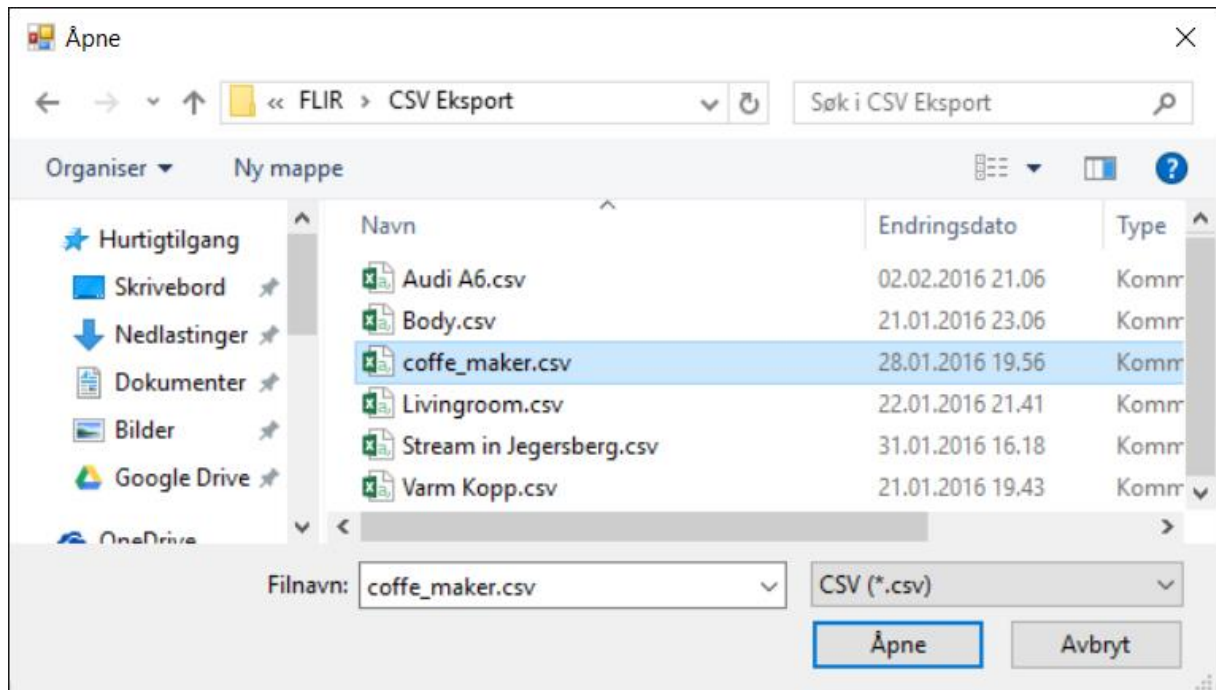
5.6 Importing image from .CSV

A thermal image exported from FLIR Tools as .csv file (Comma Separated Values file), can be imported into Palette Generator to give feedback on how the palette will affect the image. This helps to create special tailored palettes for certain images that has been exported to .CSV file.

1. Click on Image -> Load CSV



- Brows to the exported .csv file and click load. If the .csv file is successfully loaded, the image will be displayed in the Thermal Image viewport.



NOTE: Only an image exported as picture and without comments and object parameters will successfully be imported into Palette Generator at current version.

5.7 Working with parameters

The parameter list is an expandable list that contains the parameters needed for linearizing the colors for the palette. The parameters consist of two value sets: **Input** and **Color**. **Input** is the value where the selected **color** is represented. The range between two parameters will be gradient between the two colors. Example setting the first parameter as red and the next parameter as yellow, will result in a gradient going from red -> orange -> yellow.

	Input	Color
▶	0	Red
	100	Yellow

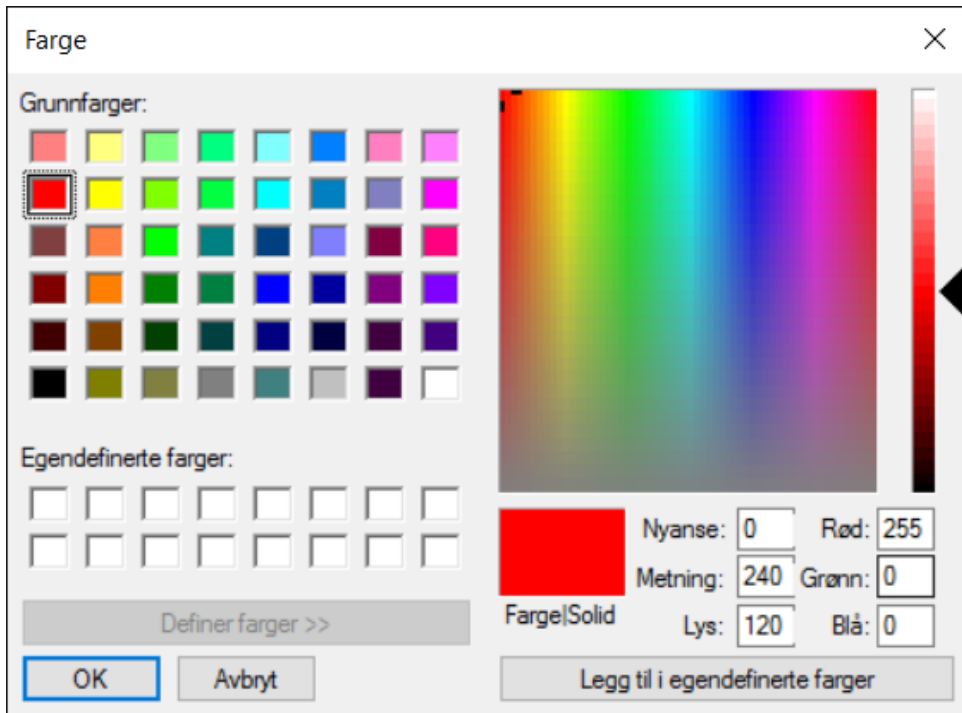


Input parameters has to be a value between 0,0 and 100,0 % representing coldest temperature = 0% and warmest temperature = 100%. Input values below 0 will be set to 0, and values above 100 will be set to 100. The colors can be changed by double-clicking the color parameter, and a color dialog will be displayed where the color can be changed.

5.7.1 Changing parameters

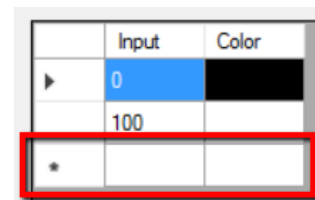
To change the input value, click the value and enter a new value. When value is entered, the palette will be automatically updated.

To change the color, double click on the color and a color dialog appears. Select color and click OK button. The palette is automatically updated with the new color.



5.7.2 Add a new parameter to the list

To add a new parameter, select the new line (lowered) and enter an input value. A Color Dialog will be displayed. In the dialog, select color and click OK. You can also double click the color cell, and select color from the Color Dialog. The input value will then default be set to 100.

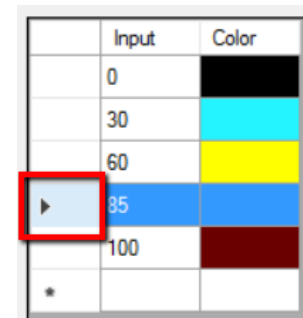


5.7.3 Delete a parameter from the list

To delete a parameter, simply click on the left column and press the **Delete** key on the keyboard. The palette is automatically updated.

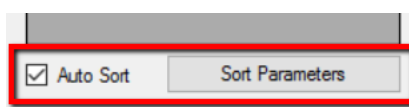
To select multiple parameters in certain range, select the first parameter in the row. While holding down **Shift**-key, select the last row and all rows between will be selected.

To only select certain rows, hold **Ctrl**-key while mouse clicking on rows to be selected.



5.7.4 Sorting of the parameter list

The parameter list is automatically sorted by input value by default, which makes the list sort itself each time a value or color is changed. To manually sort the list, uncheck **Auto Sort** check box. Press the **Sort Parameters** button to manually sort the list when automatic sorting is deactivated. The palette is always sorted on change so the linearization will work.



5.7.5 Auto Spacing

When **Auto Spacing** is checked, the parameters in the palette will automatically be adjusted equally. Example if the palette contains 5 parameters, the parameter input value will automatically be set to 0, 25, 50, 75 and 100%. If use tries to change the value, it will be ignored while **Auto Spacing** is checked.

NOTE: When the Graph Editor is used, the **Auto Spacing** is deactivated.

5.7.6 Invert Palette

To invert the color palette, Click the **Invert Palette** button. All parameters will be inverted. To go back to normal palette, simply press **Invert Palette** button again.

	Input	Color
▶	0	Black
	30	Cyan
	60	Yellow
	85	Red
	100	Dark Red
*		

	Input	Color
▶	0	Dark Red
	15	Red
	40	Yellow
	70	Cyan
	100	Black
*		

5.7.7 Drag & Drop

To reorder parameters, the input value can be changed, or the parameter can simply be Dragged & Dropped. Simply click on the selection cell outside the parameter to be moved, and move the mouse while pressing left mouse button. Release the left mouse button when mouse arrow is above the parameter line where it is to be moved to.

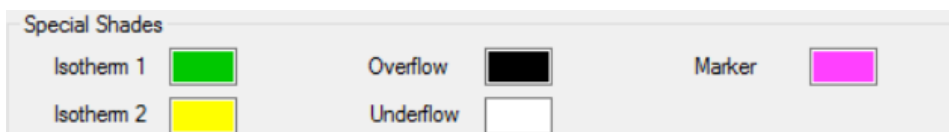
	Input	Color
	0	Dark Red
▶	15	Black
	40	Yellow
	70	Cyan
	100	Black
*		

NOTE: The Drag & Drop function will interfere differently with the input value according to which sorting mode is active.

- When no **Auto Sort** or **Auto Spacing**, the input value will not be changed and only the row where the parameter is located will be changed.
- When **Auto Sort** is active, the moved input value will be automatically changed to the middle value between the parameters above and below and the whole list will be reordered.
- When **Auto Spacing** is active, the whole list will be reordered and all values will be adjusted to the number of parameters in the palette.

5.8 Special Shades

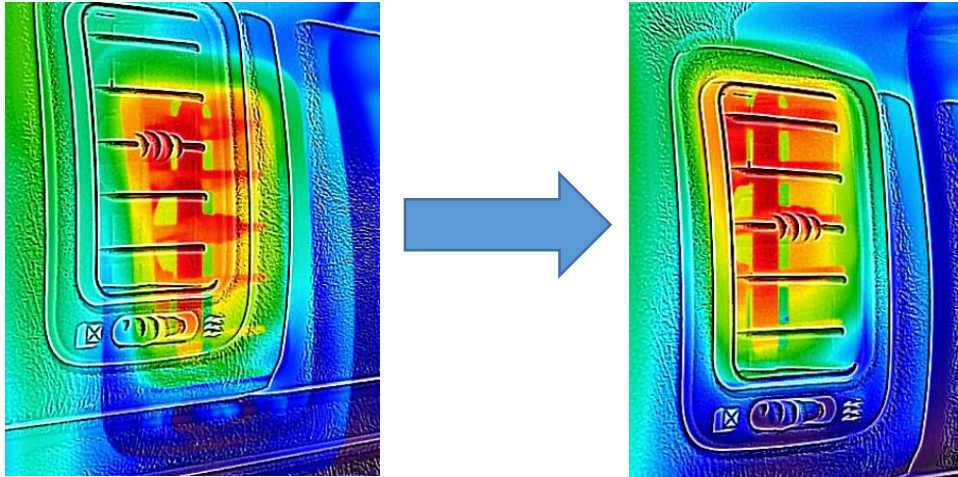
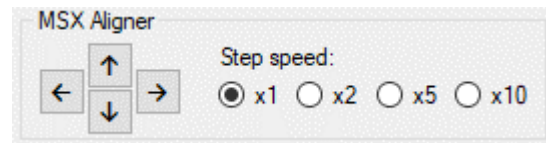
The palette contains special shades used in FLIR Tools. To adjust the color for the special shades, simply click the color box and select color. For more details about the special shades, go to FLIR Tools User Manual.



5.9 MSX Aligner

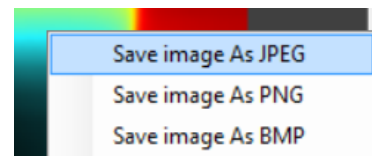
The MSX Aligner tool allows to move the MSX layer around on the thermal image to achieve correct alignment with object of interest.

The arrow buttons move the MSX layer in the direction of the arrow. The speed radio buttons specify the amount of pixels the MSX layer is moved each click on the arrow button.



5.10 Save thermal image to file

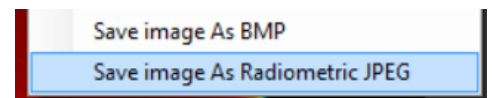
The thermal image generated from the imported .CSV file, can be saved to image file with palette colors applied. To save the image, **right click** the thermal image and select file format. In the **Save Dialog**, select name and path to save the image.



The following image formats is supported:

- **JPEG**
- **PNG**
- **BMP**

If a radiometric image is opened, the image can be saved with the palette and can be post edited in FLIR Tools. To save the radiometric image, right click the image and select **Save image As Radiometric JPEG**. In the **Save Dialog**, select name and path to save the image.



5.11 Undo and redo

All changes in the palette parameter list can be undone by clicking the undo button. To redo again, click the redo button. The undo/redo icons will be colored when there is anything that can be undone or redone.

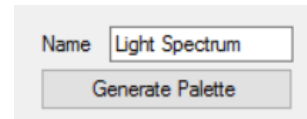


NOTE: When opening or creating a new palette, the undo/redo history is cleared and the action cannot be undone.

NOTE: When using undo of the parameter list, the change history in the Graph Editor will be cleaned and the undo function will load that parameter list into the Graph Editor.

5.12 Generating the palette

To generate the palette file, enter a palette name into the **Name** text box and press the **Generate Palette** button. This will create a .pal file with the specified name from the **Name** text box, and save it in the default FLIR palette folder at **C:\ProgramData\FLIR Systems\Palettes**.



NOTE: The FLIR palette folder path can be changed in the settings.

5.13 Create new, save and load palette save files

The palette parameters can be saved to a Palm Palette Generator file (.ppg) for later modifications or usage. Then all the parameters are saved into the file as shown in the Palette Generator, and can be later loaded for modifications.

5.13.1 Create new palette

Click **File -> New** to create a new palette. This will clear the parameter list and create a new list with default monochrome parameters (black -> white). Any unsaved changes will be discarded.

5.13.2 Save palette configuration

Click **File -> Save** to save the palette. If it has not been saved earlier and not been opened, a path has to be specified. Browse to the folder to save the palette configuration and click save. If the save has been opened or saved earlier, save will overwrite the palette configuration with the changes that is performed.

5.13.3 Save As palette configuration

Click **File -> Save As** to save the palette configuration to a new file. Browse to the folder to save the palette configuration and click save.

5.13.4 Load palette configuration

Click **File -> Open** to load a palette configuration. Browse to the folder where the palette configuration is and click open. The palette configuration will be loaded into the parameter list and the thermal image and color bar will be updated with the loaded configuration.

5.14 Importing FLIR palettes

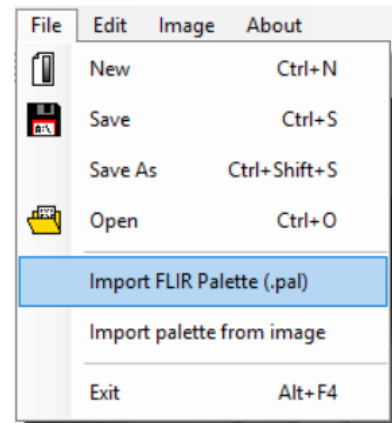
Already created palettes can be imported into the parameter list from .pal file or from opened radiometric image. The algorithm searches for the changes in the color curves and adds them to the parameter list. Some manual cleaning of imported palette might be needed, but the color scaling will be exactly as the palette file defines.

5.14.1 Import FLIR palette from file (.pal)

To import palette from .pal file, select **File -> Import FLIR Palette (.pal)**.

5.14.2 Import FLIR palette from image

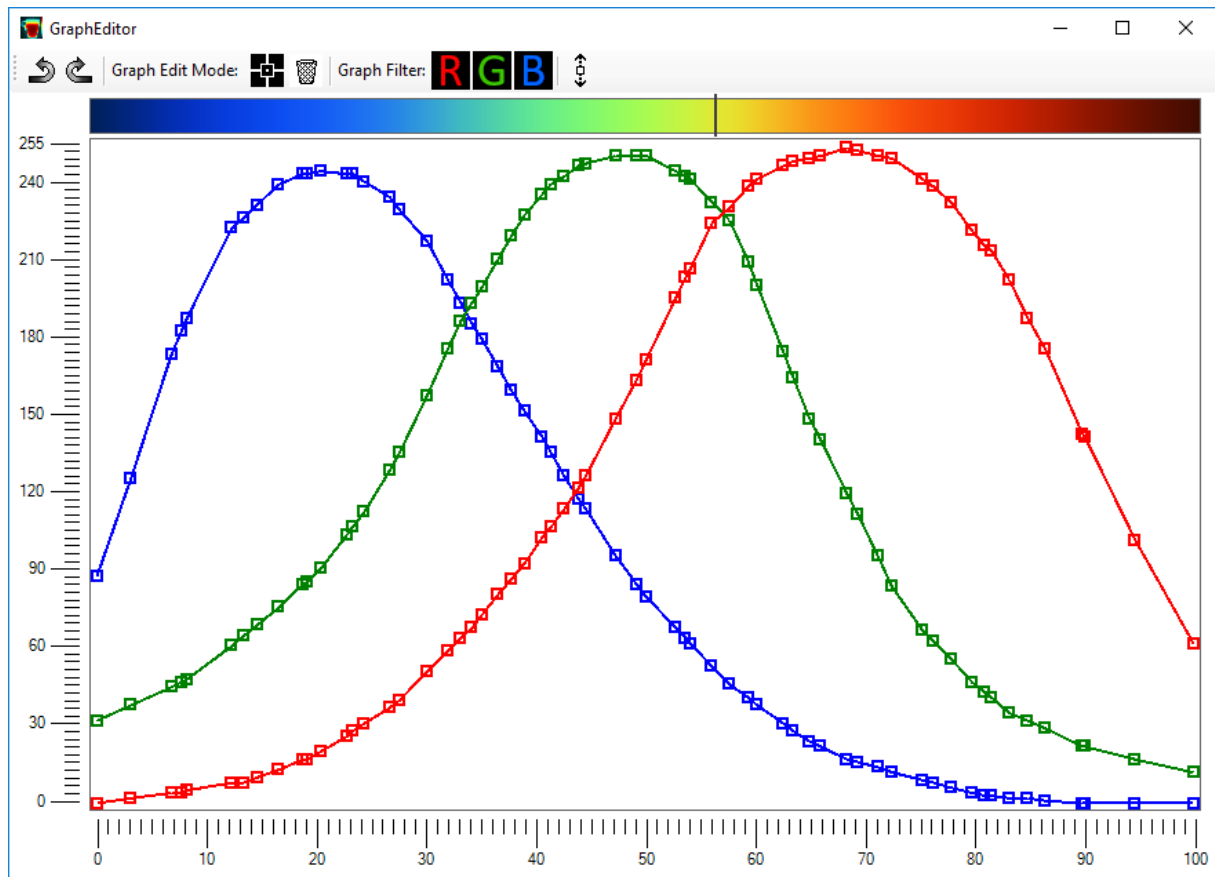
The radiometric image is saved with it's used color palette. This can be imported from the radiometric image into Palette Generator. Select **File -> Import palette from image**.



6 Graph Editor


The Graph Editor provides a different interface for adjusting the colors in the palette. The standard palette parameter list makes it easy to add colors to the palette, and the Graph Editor makes it easy to perfect them and experiment with the colors. The points on the graph can be moved, deleted and new points can be added. The data grid is automatically updated when the graph is modified, and the graph is automatically updated when the data grid is modified.

The X-axis shows the thermal range 0-100% where 0% is cold and 100% is warm. The Y-axis shows the color amplitude in byte value (0-255).



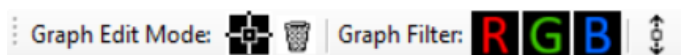
A representation of the palette color bar is shown above the graph to easy see what color is in that specific range.

When moving a point on a graph, the point will automatically be added to all three graphs (RGB) to create the color, but it will not be visible until the graphs are regenerated from the data grid. When the graphs are regenerated, all needed points are added to the graph viewport. A marker on the palette color bar indicates the mouse position when moving a point.

The Graph Editor is located under **Edit -> Graph Editor** or by clicking the  icon

6.1 Interface

The Graph Editor have several buttons to change the how the graph manipulation behaves. When a function is active, the button background





will be black. In this image, the add new point is active and all three RGB graphs are visible.

To move a point in the graph, press and hold left mouse button and drag the point to the new value. The point cannot be higher or lower than the neighbor point in the X-axis.


6.1.1 Graph Edit Mode

The Graph Edit Mode sets what happens when the right mouse button is clicked on a line or a point.


When **Add Point** mode is active  a new point is added on the line that is right mouse clicked.

When **Delete Point** mode is active  the point that is right clicked by the mouse is deleted.

6.1.2 Graph Filter

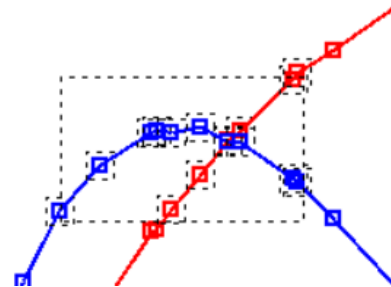
The Graph Filter allows to show and hide graphs of specific colors.  Default all colors are visible. If a button is clicked, the graph for that color is hidden until button is clicked again.

6.1.3 Vertical lock

The **Vertical Lock** is used to lock the point movement to the Y-axis. 

6.1.4 Multi Selection and Multi Move

Multiple points can be selected and moved simultaneously. To use select multiple points, press and hold left mouse button on an open area, and drag the selection box over the points to be selected. When left mouse button is released, the selection will be completed. Points on all graphs can be selected simultaneously. To move multiple points (points selected), press and hold the left mouse button while moving the mouse cursor.



To deselect, click on an open area or click on a point that is not selected.

6.2 Undo and redo



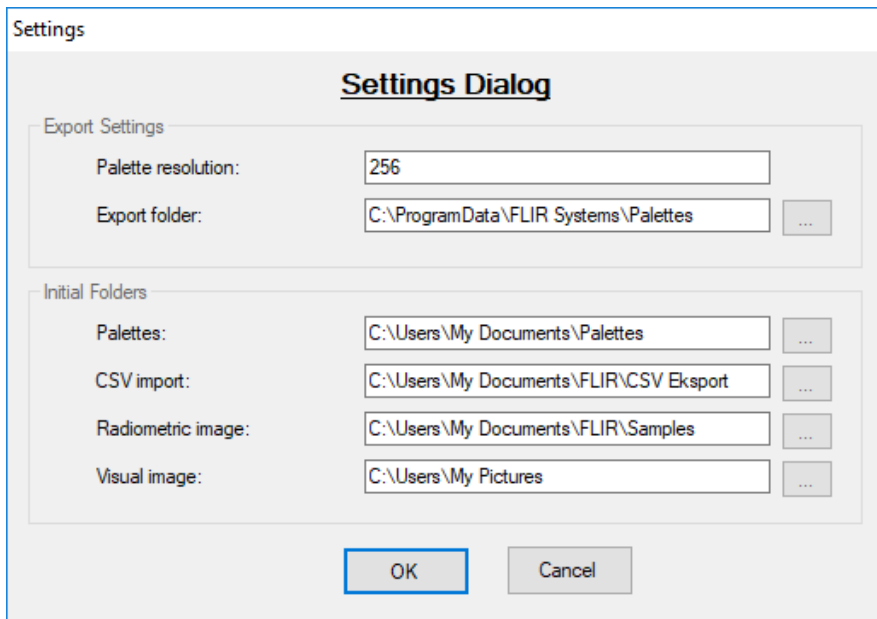
When a change in the Graph Editor is performed, the change is saved in an undo/redo history. By clicking the undo or redo button, the graphs are changed to that change in history. The parameter list is also updated with the parameters from the graph. If then the graph is changed by moving a point or adding a new one, that change will be the last performed change.

NOTE: It's important to know that the undo/redo function in the Graph Editor is not the same as in the main user interface. Changes in the graph editor will not be added to the main undo/redo functionality and will only be added to the Graph Editor. But the latest change is saved to the main undo/redo functions.

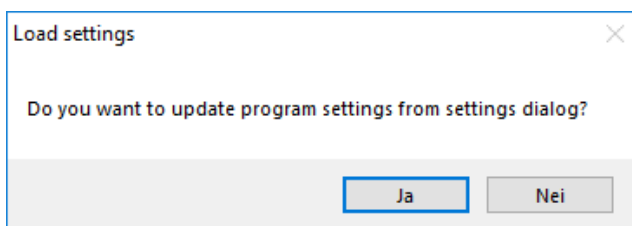
NOTE: If any manual changes in the parameter list (main user interface), the graph is saved to main user interface change history and the graph is then updated with the parameter list form the main user interface and the Graph Editor change history will be cleared.

7 Settings

The settings dialog provides user specific settings to be set. The settings are saved in a settings file, and are loaded when program starts.



When closing the settings dialog, a message box will ask if the settings are to be loaded into the program. If yes, the settings will be overwritten. If no, old settings will be used until the program is restarted.



7.1 Export Settings

Export Settings contains settings used during palette export to FLIR Tools.

7.1.1 Palette resolution

The exported palette file consists of a table of RGB colors. The **Palette resolution** value describes how many rows the table will have with colors. The higher resolution, the smoother the transitions between colors will be. More complex palettes will require higher resolution. The resolution cannot be less than 1.

Default resolution is **256**.

7.1.2 Palette export folder

The **Palette export folder** path sets where the Palette Generator will save the palette file. This would normally be set to FLIR Tools Palette directory. Default path is **C:\ProgramData\FLIR Systems\Palettes**.

7.2 Initial folders

Initial folders specify what folder that should open when saving/opening palettes, CSV files and images. If empty, last opened folder will be used.

7.2.1 Palettes

Specify initial folder when opening or saving a Palette Generator palette file (.ppg)

7.2.2 CSV import

Specify initial folder when importing a FLIR Tools CSV file (.csv)

7.2.3 Radiometric image

Specify initial folder when opening a thermal image containing radiometric data (.jpg | .jpeg)

7.2.4 Visual image

Specify initial folder when saving image as non-radiometric JPEG, PNG or BMP image file (.jpg | .png | .bmp).

8 Shortcuts

List of shortcuts used in the program.

Description of items in picture:

Category	Shortcuts	Description
File	Ctrl + N	Create new palette
	Ctrl + O	Open Palette Generator file (.ppg)
	Ctrl + S	Save Palette Generator file (.ppg)
	Ctrl + Shift + S	Save Palette Generator file as (.ppg)
	Alt + F4	Exit Palette Generator application.
Edit	Ctrl + Z	Undo change in palette color list
	Ctrl + Y	Redo change in palette color list
	Ctrl + G	Open/show Graph Editor
Image	Ctrl + R	Open radiometric JPEG (.jpg/.jpeg)
	Ctrl + Shift + R	Save image as radiometric JPEG (.jpg)
	Ctrl + T	Auto Scale thermal range.
About	F1	Show documentation.
Graph Editor	Ctrl + Z	Undo change in graph
	Ctrl + Y	Redo change
	A	Select add point mode
	D	Select delete point mode
	R	Toggle red graph filter
	G	Toggle green graph filter
	B	Toggle blue graph filter
	L	Toggle vertical lock mode

9 Support

For any questions or needed support, go to the Discussion and support forum at <https://groups.google.com/d/forum/palette-generator/>. Link to form can be found in Palette Generator at **About -> Support**.

10 Error Reporting

The current state of this program is in BETA mode and errors may occur. If any errors do occur, please report them at <https://bitbucket.org/napalmy/palette-generator-binary/issues> and mark it as “bug”.

11 Feedback and Improvements

Feedback and requested improvements is always wanted. Please post them at <https://bitbucket.org/napalmy/palette-generator-binary/issues> and mark them as “enhancement” or “proposal”