PYROSOFT Professional

Software Manual

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Table of Contents

CHAPTER 1

General Information about PYROSOFT Professional

This manual describes the **PYROSOFT Professional** software, which was developed to operate IR cameras under **Windows®**.

PYROSOFT Professional IO has some additional functions to operate with an optional connected IO system.

There are 3 different variations of **PYROSOFT Professional**:

- **PYROSOFT Professional Online:** real time analysis and display of online data
- **PYROSOFT Automation Offline:** subsequent analysis of saved data
- **PYROSOFT Automation Reference Image Viewer:** displaying a product-specific reference image concurrent to online acquistion

For the most part this documentation deals with **PYROSOFT Professional Online**. For handling **PYROSOFT Automation Offline** and **Reference Image Viewer** see the respective chapters.

PYROSOFT Professional Features:

General Information

- Multi-language software for Windows® 7 and higher versions,
- Temperature unit °C, °F, K or RU
  (see **Program Settings** on page **95**)

User Interface

- Professional document interface with variable views
- Multi-document interface for simultaneous handling of different documents
  (see **The Program Desktop** on page **15**)

File Handling

- Opening IRDX and IRDA files
  (see **Opening Files** on page **12**)
- Thumbnail view, preview, print
- Bitmap and video export (BMP, GIF, JPG, PNG, TIFF, AVI, WMV)
  (see **Data Export** on page **81**)
- Text export (see **Data Export** on page **81**)

Image Display

(See **Data Analysis and Presentation** on page **33**)

- Several color bars and scaling ranges including auto scaling
- Zoom functions with auto-zoom, full screen view, rotation and flipping

Data Analysis

(See **Data Analysis and Presentation** on page **33**)

- Correction of emissivity, transmittance and ambient temperature
- Temperature limitation for image

- Difference image with customized reference image
- Filter image (minimum, maximum, average, image size)
- Isotherm display

ROI (Region of Interest)

(See **ROI – "Region of Interest"** on page **40**)

- Points, lines, areas (rectangle, circle/ellipse, polygon)
- Display of hot and cold spots for lines and areas
- Individual correction of emissivity, transmittance and ambient temperature inside of each ROI
- Individual temperature limitation for each ROI
- Editing functions (copy, insert, delete, undo)
- Definition and display of ROI groups
- Split ROI into Sub ROI
- Self-adjusting ROI
- Histogram calculation
- Spot calculation
- Calculation of FFT

VOI (Value of Interest)

(See **VOI – "Value of Interest"** on page **51**)

- Definition of VOI values from calculated ROI values, available functions: value, sum, difference, minimum, maximum, average, standard deviation, histogram, spot, product, quotient functions, constant value, absolute value functions, FFT, correlation, line values
- Definition of VOI alarms from calculated VOI values, one or two fix or variable thresholds, optionally with hysteresis or time functions
- Definition of VOI alarm combinations (OR, AND, NOT) from calculated VOI alarms
- Trend chart and histogram of VOI values

Reports

(See **Creating Reports** on page **89**)

- Easy and fast report creation with user defined templates for Microsoft® Word
- Single or multi report for all views, ROI and VOI lists, scales, profiles, trend charts, histograms

Real-time Online Data Acquisition

(See **Online Data Acquisition** on page **19**)

- Use and manage document templates
- Data and alarm saving, text and bitmap export
- ROI and VOI calculation, trend charts, histograms

Additional Features of PYROSOFT Professional IO

- Connect a hardware IO sub system (PROFIBUS®, PROFINET®, WAGO®, TCP socket, MODBUS) or the text file IO sub system Text IO
- Analog and digital value output (measurement values, alarms)
- Control online data acquisition (start, stop, shutter, trigger)
- Trigger for reference and difference image
- Control online export functions
- Import reference values for correction and calculation procedures
- Connect an external pyrometer for correction and calculation procedures

If you have any questions about **PYROSOFT Professional**, we would ask you to read this manual first.

In case of problems with **Windows®**, we would refer you to the appropriate literature or to the 'Help' program.

Should you still have any open questions, noticed any errors in this manual or wish to pass on any tips and suggestions for improvement, please inform your supplier or contact us directly:

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This way, you help us to provide you with the best possible software and software documentation.

CHAPTER 2

Installing PYROSOFT Professional

Installing **PYROSOFT Professional**

In this Chapter

License Terms

The use of **PYROSOFT Professional** software is licensed for the corresponding serial number of a camera.

The software cannot be transferred to a third party without the written agreement of DIAS Infrared GmbH.

We reserve the right to modify information and data in this manual without prior notice.

No part of this documentation may be reproduced or transmitted without the express written approval of the manufacturer.

Terms of Guarantee

Although the software has been tested extensively, claims for guarantee or liability for damages cannot be accepted, due to the multiplicity of hardware and software environments in which this software can be used.

No guarantee is given for the completeness or correctness of the content of this documentation.

Hardware and Software Requirements

PYROSOFT Professional software runs under Windows® 7 and higher versions (32 and 64 Bit).

Depending on the camera model, the corresponding PC interface must be available.

Data acquisition via Ethernet:

An Ethernet connection must be available on the PC. To communicate with a camera, the IP addresses of the Ethernet adapter and the camera must be set to the same sub-network. The add-on program **SetIP.exe** (see **Add-on Programs and Troubleshooting** on page **101**) is available to retrieve and set the camera's current IP address.

Installation Instructions

To install **PYROSOFT Professional**:

- Insert the installation CD for **PYROSOFT Professional** in a CD drive and start the **PYROSOFT Professional_V****.exe** program directly from CD.
- Follow the instructions of the installation program.

The installation program will:

- Copy all required files into a directory (Default setting: **C:\Program Files\DIAS\PYROSOFT Professional**)
- Create a **DIAS** program group in the start menu including an entry for **PYROSOFT Professional** and additional entries for Help and Diagnostic program files.

Program settings

Current program settings are stored in user-specific configuration files by default.

The storage location for setting files is the directory for custom application data:

- under Windows® 7, 8, 10: C:\Users\<Username>\AppData\Roaming**PYROSOFT Professional**

By default, these folders are not visible for users. To make them visible, open the Windows Control Panel "Folder Options" > "View" > "Hidden files and folders" and select the option "Show hidden files and folders".

If the program is installed outside of Windows® program folder, the program settings are stored in the local installation folder.

Multiple installations

Multiple installations of **PYROSOFT Professional** in separate directories allow the user to manage independent program settings.

Among other things, this allows the installation of varying **PYROSOFT Professional** software versions, the organization of different measuring tasks or the operation of several devices with specific settings.

Uninstalling PYROSOFT Professional

To uninstall **PYROSOFT Professional**:

- Start the Windows Add/Remove Program (**Start |Control Panel | Add or Remove Programs**). Select **PYROSOFT Professional** from the list of available programs and click **>> Change/Remove**.

CHAPTER 3

Starting and First Steps

Starting and first steps with **PYROSOFT Professional**

In this Chapter

Starting PYROSOFT Professional

After installing **PYROSOFT Professional**, you can launch the software from the start menu or the desktop icon.

During program start, a device detection procedure begins to search for cameras connected via the specified interfaces (add-on program **SetDetect.exe,** see **Add-on Programs and Troubleshooting** on page **101**).

If a camera that supports online data acquisition (depending on the type of camera) is found, a new measurement document will be created automatically (see **Creating New Measurement Documents** on page **19**) and the data acquisition starts.

You can now:

- Work with the new measurement document (see **Online Data Acquisition** on page **19**),
- Open saved measurement documents for viewing and analyzing (see **Data Analysis and Presentation** on page **33**),
- View, save or delete images from an internal image memory of a possibly connected portable camera (see **Internal Image Memory of a Portable Camera** on page **31**).

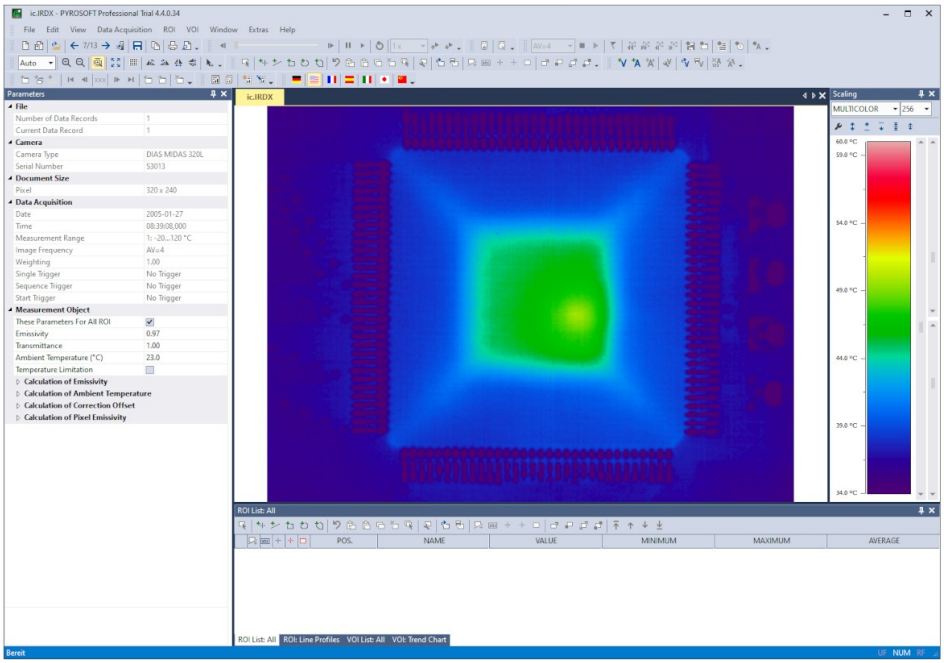
The settings for the program start can be changed by using menu item **[EXTRAS > Options]** (see **Program Settings** on page **95**).

In the event that no camera is found during device detection, **PYROSOFT Professional** asks if the add-on program **SetIP.exe** (see **Add-on Programs and Troubleshooting** on page **101**) should be started. Confirm with "Yes" if you want to adjust the network configuration of your camera so that **PYROSOFT Professional** can establish a connection.

For further details see the PYROSOFT Add-on Programs and Troubleshooting manual.

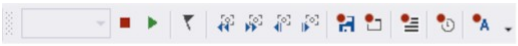
Online Data Acquisition

If a camera was detected during program start, a new measurement document will automatically be created and the data acquisition starts.



Cameras with OF-SBK01/SBKBM and DSP cameras: In order to be able to open a connection to the camera, compatibility mode has to be activated (add-on program **SetDetect.exe,** see **Add-on Programs and Troubleshooting** on page **101**).

The essential data acquisition functions can be found on **Toolbar "Data Acquisition"** (see page **104**):



The data acquisition can be started and stopped using the buttons **[Start Data Acquisition]** and **[Stop Data Acquisition]**.

To focus the infrared image use the buttons **[Focus Near]** and **[Focus Far]** (only available for cameras with motor focus).

For saving the received images see **Online Data Saving** on page **26**.

The execution of measurements is described in detail in **Online Data Acquisition** (see page **19**).

In **Property Pane "Scaling"** (see page **109**) scaling and coloring can be changed.

The different elements of the program desktop are discussed in detail in **The Program Desktop** on page **15**.

Presentation and analysis of measurement data is described in **Data Analysis and Presentation** on page **33**.

The possibilities for exporting data are presented in **Data Export** (see page **81**).

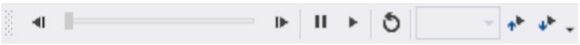
Opening Files

Saved files can be opened by clicking on menu item **[FILE > Open]** or **Toolbar "Standard"** (see page **103**).

The following file formats are supported:

- DIAS IRDX files (*.irdx)
- DIAS IRDA files (*.irda)

Opening a file containing multiple data records, it is possible to navigate through the sequence by using the Data Player – see **Toolbar "Data Player"** (see page **103**):



The different elements of the program desktop are discussed in detail in **The Program Desktop** on page **15**.

Presentation and analysis of measurement data is described in **Data Analysis and Presentation** on page **33**.

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Principles of Data Analysis

Data analysis can be done in the online measurement document as well as in saved files (single images or sequences).

For the analysis of infrared data using **PYROSOFT Professional** the following terms are important:

ROI ("Region of Interest")

A ROI is a particular image section, whose measurement data are to be used for further analysis. That could be a single point, a line or a partial area (rectangle, ellipse, polygon) of the camera image (see **Insert a ROI** on page **41**).

Corresponding parameters are assigned to every ROI, for example:

- Position and dimensions
- Temperature minimum, maximum, average, standard deviation

You can find detailed information on ROI in chapter **ROI – "Region of Interest"** on page **40**.

VOI ("Value of Interest")

All data generated by the ROI can used as a VOI in order to process and analyse them. That could be a single value, for example the average temperature of a ROI. However, varied combinations (difference, minimum, etc) of multiple different ROI parameters are possible (see **Data Source of VOI Values** on page **52**).

The calculated VOI value can then be processed further or used for:

- Output on the screen
- Output by an IO system
- Display as trend chart
- Generate an alarm

Alarms are binary VOI that are generated by comparing a VOI value with one or two threshold values (see **Data Source of VOI Alarms** on page **55**). They can be output on the screen or by the IO system. Also, the online data saving can be controlled using alarms (see **Output of VOI Alarms** on page **58**).

For further information on VOI and alarms see chapter **VOI – "Value of Interest"** on page **51**.

Working with Portable Cameras

If a portable camera using an internal image memory is connected to the computer, **PYROSOFT Professional** is able to download the infrared images from the internal image memory to the hard drive (see **Internal Image Memory of a Portable Camera** on page **31**). Afterwards the downloaded images can be viewed and analyzed in **PYROSOFT Professional** (see **Data Analysis and Presentation** on page **33**).

Toolbar "Image Memory" (see page **103**) provides the necessary tools for working with the internal image memory of a portable camera.

CHAPTER 4

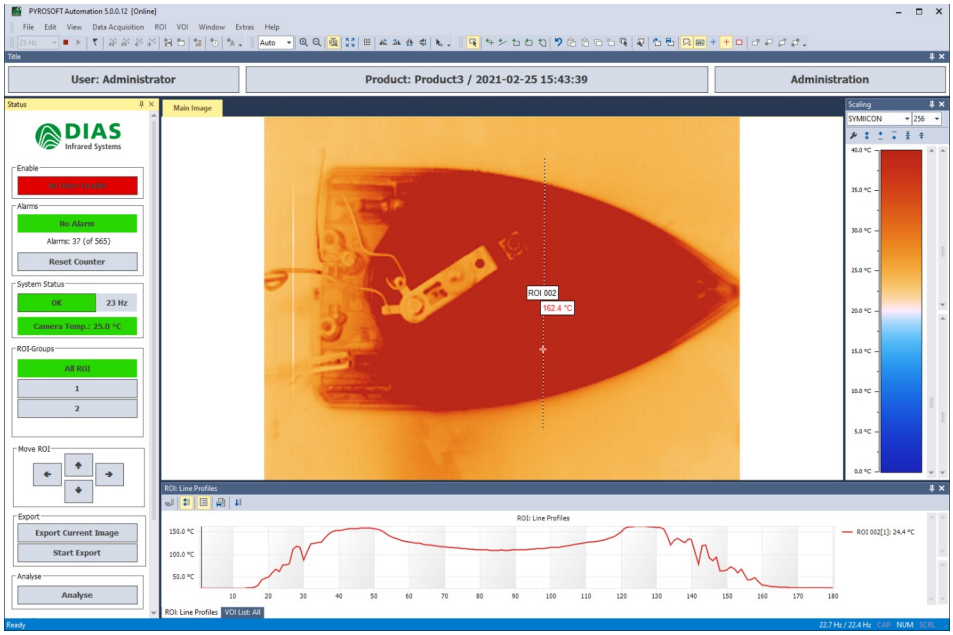
The Program Desktop

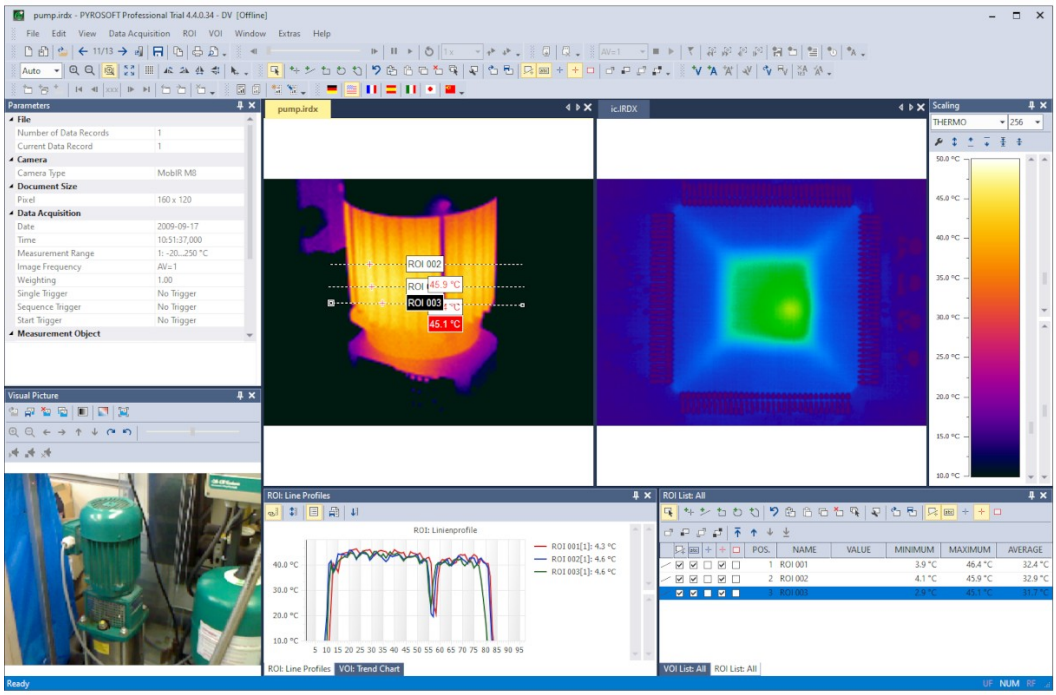
The program desktop of **PYROSOFT Professional**

In this Chapter

Workspace

PYROSOFT Professional possesses a multi-document structure, i.e. several documents may be opened simultaneously.





The program desktop of **PYROSOFT Professional** contains:

- Menu Bar, Toolbars, Status Bar

- Image Windows:
  Image windows present the measured data as colored image. One measurement document can consist of several images (e.g. reference image, difference image).

- Property Panes:
  Property panes represent specific properties of an active image window or its associated measurement document (e.g. parameters, scaling, ROI lists, line profiles, trend charts, etc.).
  Property panes are freely movable on the program desktop and may be moved to other positions by "dragging with the mouse".
  Property panes may be closed or moved to the background. They may be reopened using menu **[VIEW].**

The program desktop can be reset to default settings by using menu item: **[VIEW > Reset Layout]**.

Color Scheme

Various color schemes are available for **PYROSOFT**. They can be selected via the menu item **[EXTRAS > Color Scheme...]**.

Language

PYROSOFT Professional language settings can be changed in menu item **[EXTRAS > Language]**. The change will be valid straightaway, a reboot of the application is not required.

Toolbars

The following toolbars are available:

Standard

Data Player

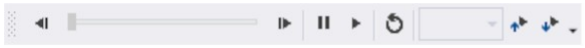
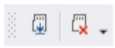


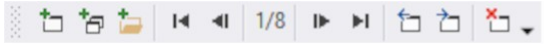
Image Memory



Data Acquisition

View

Album



Report

ROI

ROI: Groups

ROI: Move

VOI

VOI: Teach-In

Language

To change the toolbar settings right-click on the toolbar and select **[Customize]**. There you can also define individual shortcuts for the commands.

The individual features of the toolbars are listed in **Appendix** on page **103**.

Image Window

The Image Window is the central part of the program desktop. It displays the currently measured thermal imaging values.

The **Toolbar "View"** contains helpful features for working with image windows (see page **104**), e.g. zooming, full screen view (see page **33**), grid lines, rotating and flipping.

Image zoom can also be controlled using the mouse scroll wheel in conjunction with the Ctrl key.

If the image is displayed tilted or mirrored, then the original orientation can be restored via the menu item **[View > Default Orientation]**.

Settings for full screen view and grid lines may be modified in menu item **[Extras > Options]** (see **Program Settings** on page **95**).

If more than one image is open, the images are displayed in tabs. The buttons for switching between images are located above the current image. With "Drag and Drop", the order of tabs may be changed.

It is also possible to display several images in a tab group simultaneously, either in vertical or horizontal arrangement.

To show a vertical arrangement, use the menu item **[WINDOW > New Vertical Tab Group]**.

To show a vertical arrangement, use the menu item **[WINDOW > New Horizontal Tab Group]**.

The tabs can be arranged within the horizontal or vertical tab groups and may be moved from one tab group to another.

Property Panes

Property panes represent specific properties of an active image window or its associated measurement document.

The following Property Panes are available:

- Parameters
- Visual Picture
- Scaling
- 3D Image
- Isotherms
- ROI List: All, Points, Lines, Areas
- ROI: Line Profiles
- ROI: FFT Line Profiles
- ROI: Histograms
- VOI List: All, Values, Alarms, Alarm Combination
- VOI: Trend Chart
- VOI: Online Alarm Logging
- VOI: Online Alarm Messages
- VOI Diagram: Alarm Counter
- VOI: Current Alarm Message
- VOI: Alarm Message History
- VOI Overview: Values
- Copy: Main Image, Reference Image, Difference Image, Filter Image, 2D Line Image, History
- Digital Outputs of Camera

If a Property Pane is not visible on the program desktop, it can be opened by using menu **[VIEW]**.

The individual features of the property panes are listed in **Appendix** on page **103**.

CHAPTER 5

Online Data Acquisition

Online Data Acquisition in **PYROSOFT Professional**

In this Chapter

Creating New Measurement Documents

To create a new measurement document use menu item **[File > New: Online]** or the **Toolbar "Data Acquisition"** (see page **104**).

During program start, a device detection procedure begins to search for cameras connected via the specified interfaces (add-on program **SetDetect.exe**, see **Add-on Programs and Troubleshooting** on page **101**). If a camera was detected, a new measurement document is being automatically created and the data acquisition starts.

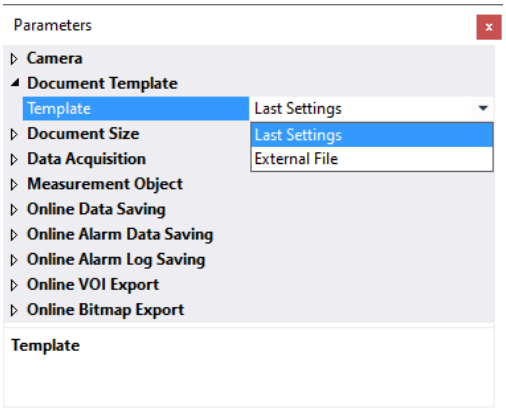
The **Toolbar "Data Acquisition"** contains helpful functions for working with an online document (see page **104**):

Menu items to modify the document template and acquisition parameters are located in menu **[DATA ACQUISITION]** or in **Property Pane "Parameters"** (see page **107**).

Document Templates

By default, the acquisition parameters (measurement range, measurement frequency etc.) and other properties (emissivity, ROI etc.) are loaded from the last settings made for that particular camera.

With **Property Pane "Parameters"** (see page **107**), an external file can be used to store document settings. This way, it is possible to save and reuse different templates for different measurement tasks or devices.



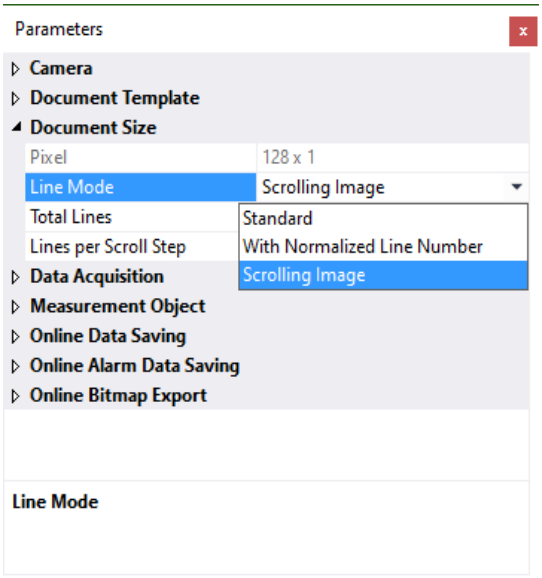
For changing the document template the data acquisition has to be stopped.

Acquisition Parameters

The acquisition parameters can be set using **Property Pane "Parameters"** (see page 107). This is only possible if data acquisition is stopped.

Document Size for Line Cameras

For line cameras, the line mode and the total number of lines for an image may be set, defining the final document size.



- Line Mode: Standard
  During data acquisition, the preset number of "Total Lines" will be completely recorded, followed by calculating and updating the whole image on display.
- Line Mode: With Normalized Line Number
  During data acquisition, the recorded lines will be converted to the preset "Normalized Line Number", compressing or stretching the image, followed by calculating and updating the normalized image.
- Line Mode: Scrolling Image
  The preset number of "Lines per Scroll Step" will be recorded, followed by a "Scroll Step" in the document. Afterwards, the whole image is being calculated and updated.

Measurement Range

If a camera is equipped with more than one measurement range, the active range may be set by choosing between the available measurement ranges:

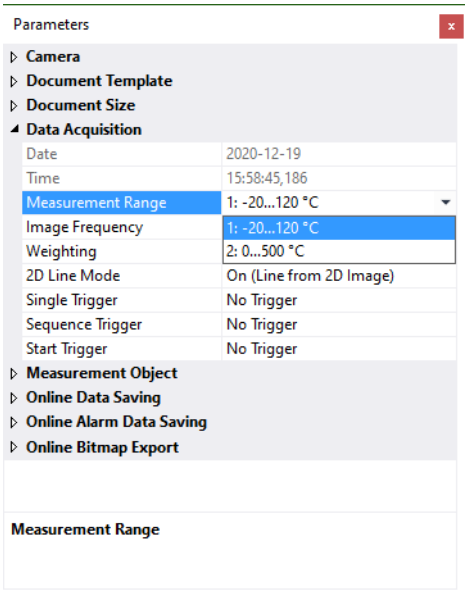
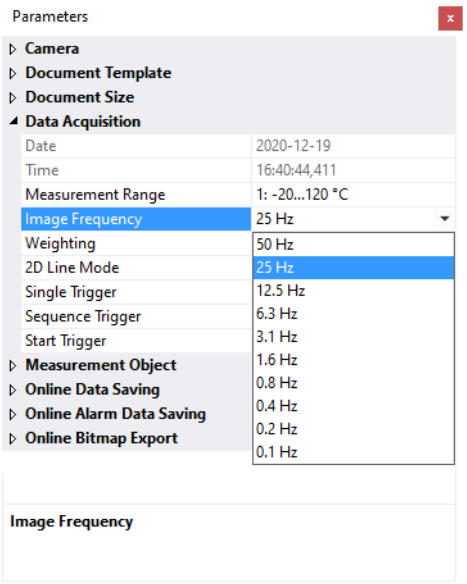


Image Frequency

The speed of data processing is determined by the preset image frequency.

The image frequency may be changed by using **Toolbar "Data Acquisition"** (see page **104**) or category "Image Frequency" in **Property Pane "Parameters"** (see page **107**).



Annotation:

Each camera works with an internal maximum measurement frequency.

A fix temporal averaging reduces the processing measurement frequency, working in powers of two (1, 2, 4 ...). Accumulating and averaging pixel by pixel over the preset number of data records, the influence of noise reduces and the temperature resolution improves.

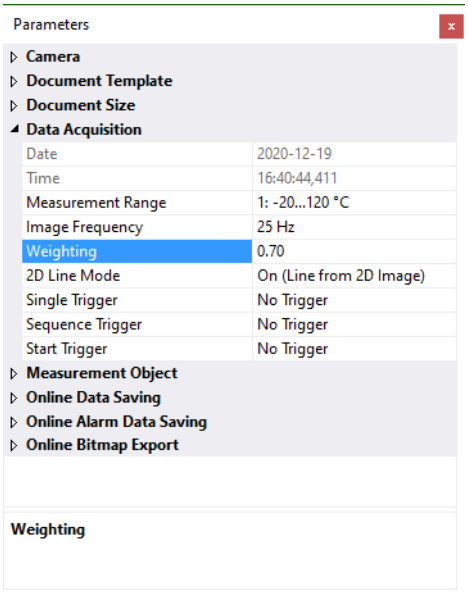
During synchronous data processing, complex calculations and presentations (e.g. ROI, VOI etc.) can cause data loss (meaning lost data records).

If data acquisition is started, the current data processing frequency is displayed in the status line. The first number indicates the speed of data processing, the second number the current display frequency.

By clicking on menu item **[EXTRAS > Options: Extras]** (see **Program Settings** on page **95**), specific settings for possibly necessary data processing optimizations may be set.

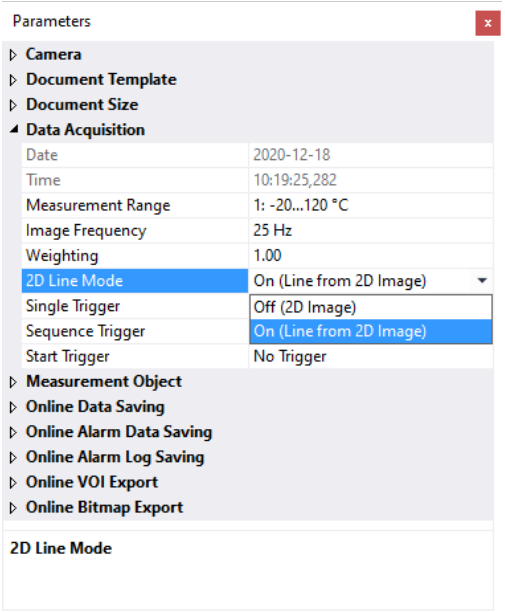
Weighting

In order to reduce noise it is possible to employ a moving average for the running data acquisition. The measurement data of the current and the preceding image will be averaged according to the set weighting. A value of 0.5 means an equal averaging. A value of 0.7 would mean a ratio of 30% old data to 70% new data. The default value 1.00 (equates to 100% current data) deactivates the moving averaging.



2D Line Mode

In 2D line mode it is possible to operate a 2D camera as line camera. The data acquisition is then executed exclusively for the pixels belonging to the defined line. The measurement data will be displayed similarly to a regular line camera, see **Document Size for Line Cameras** on page **20**.



To set the desired position and orientation of the line (provided that data acquisition is stopped):

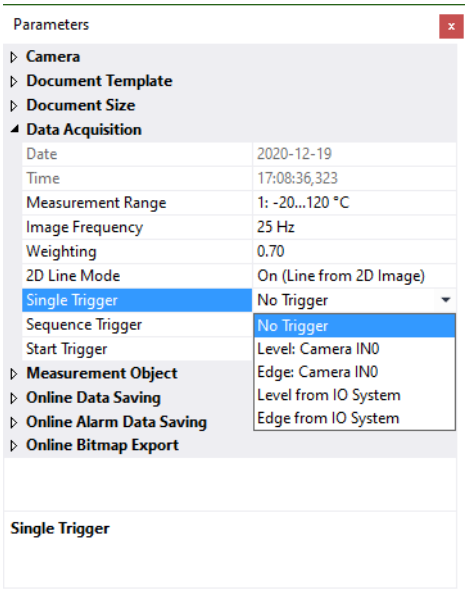
- Right click on the 2D camera image and choose **[2D Line Mode > Show Line]** in the context menu.
- The line will be displayed in the main image and can be positioned according to your wishes (Button **[Select ROI]** in the **Toolbar "ROI"** (see page **105**)).
- Right click on the 2D camera image and choose **[2D Line Mode > Save Line]** in the context menu.

Notice: In 2D line mode the 2D camera image is not available.

If you want to utilize the 2D image and line image in parallel then we recommend to use the **2D Line Image** for ROIs, see page **74**.

Single Trigger

For a line camera the single trigger serves as trigger for a single line, for a 2D camera as trigger for a single 2D image.



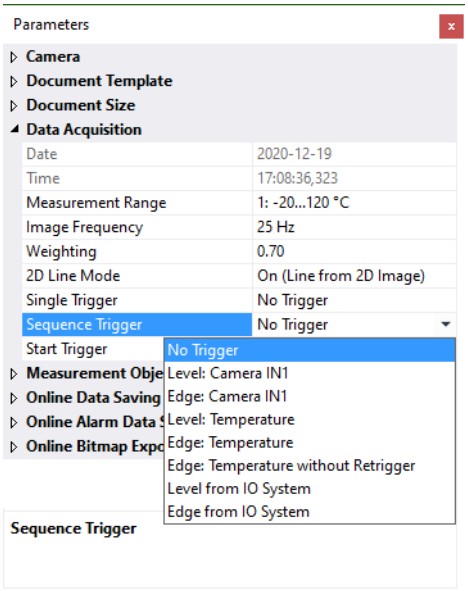
The camera can be triggered by using a digital input of the camera if the camera is equipped and configured accordingly.

Also, if the software configuration allows for the use of an IO system, a digital input signal can be used as trigger.

For cameras with configurable input/output, the program **CamConfig.exe** (see **Add-on Programs and Troubleshooting** on page **101**) is available to set the single trigger configuration.

Sequence Trigger

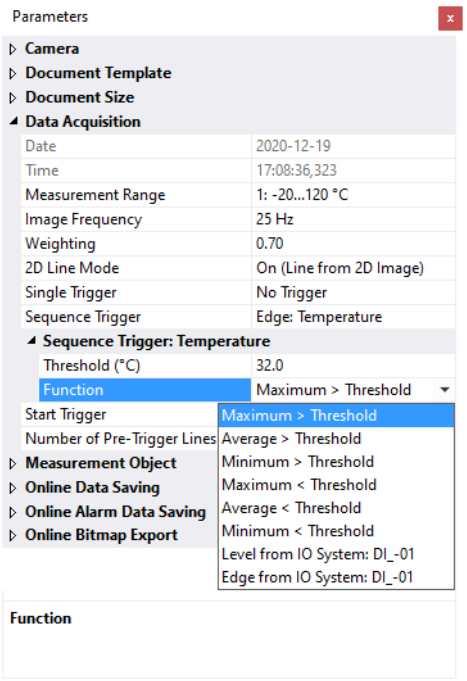
For a line camera the sequence trigger is used to trigger the first line of an image and for a 2D camera to trigger a single 2D image.



The camera can be triggered by using a digital input, if the camera is equipped and configured accordingly.

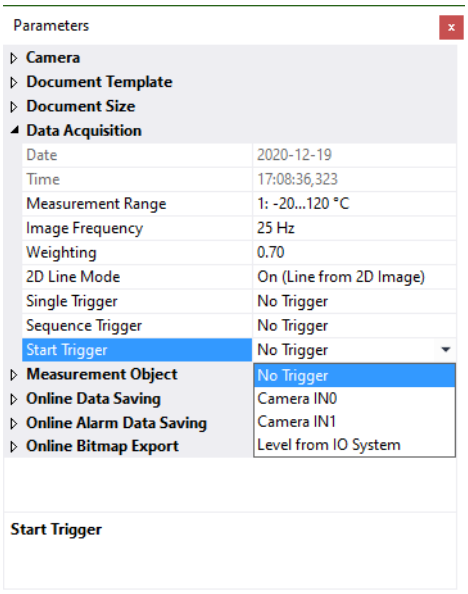
For cameras with configurable input/output, the program **CamConfig.exe** (see **Add-on Programs and Troubleshooting** on page **101**) is available to set the sequence trigger configuration.

Also, a sequence may be triggered by a temperature threshold or a digital input signal if the software configuration allows for the use of an IO system.



Start Trigger

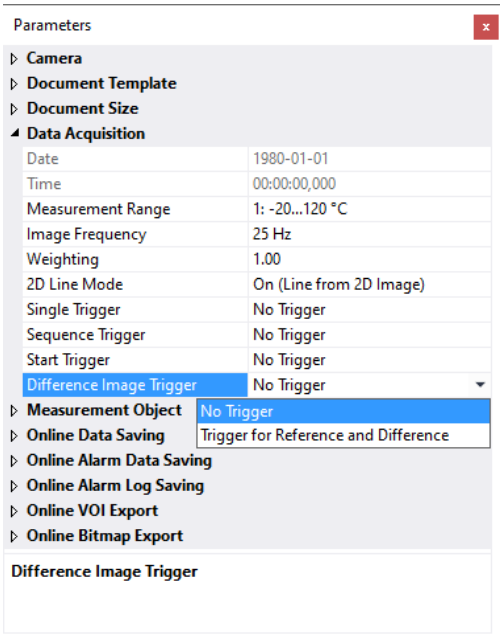
The camera is triggered by using one of the cameras digital inputs. The data acquisition is running as long as the start trigger is active.



Also, if the software configuration allows for the use of an IO system, a digital input signal can be used as trigger.

Reference and Difference Image Trigger

In connection with a reference and/or difference analysis (see **Reference Image** on page **71** and **Difference Image** on page **72**), the reference and/or difference image can be triggered manually by using menu **[VIEW]** or automatically using a connected IO system.



Pre-Trigger

If a line camera is set to be triggered by sequence trigger a so called pre-trigger may be used. Pre-trigger lines occurred before the actual trigger event, enabling the user to take a look at the past conditions.

The defined number of pre-trigger lines will be added to the document once the sequence is triggered.

This feature is not available in compatibility mode (see **Add-on Programs and Troubleshooting** on page **101**).

Starting and Stopping Data Acquisition

Online Data Acquisition can be started and stopped by using **Toolbar "Data Acquisition"** (see page **104**), or the menu **[DATA ACQUISITION]**.

If an IO system is attached, the data acquisition can also be controlled via a digital input signal. For more information see **Start Trigger** on page **24**.

Shuttering

For cameras working with a shutter, the automatic shuttering will be executed by the camera during data acquisition.

Manual shuttering can be accomplished by using **Toolbar "Data Acquisition"** (see page **104**), or menu item **[DATA ACQUISITION > Shutter Procedure]**.

If an IO system is attached, the shuttering can also be controlled via a digital input signal.

Motor Focus

If the camera is equipped with a motor focus, the focusing of the camera may be changed during online data acquisition by using **Toolbar "Data Acquisition"** (see page **104**) or menu **[DATA ACQUISITION > Motor Focus]**.

Online Data Saving

During online data acquisition, data records may be stored automatically on hard disk.

The following data formats are available for online data saving:

- IRDX data (raw data for evaluation with **PYROSOFT**)
- JPG image files of the infrared images
- VOI values as text file
- Image temperature values as text file

The online data saving parameters can be set using **Property Pane "Parameters"** (see page **107**). This is only possible if data acquisition is stopped.

With **Toolbar "Data Acquisition"** (see page **104**) or menu **[DATA ACQUISITION],** online data saving can be activated and deactivated.

If online data saving is activated, there are various possibilities of setting the saving interval and the saving file name.

The following options are available for the saving interval:

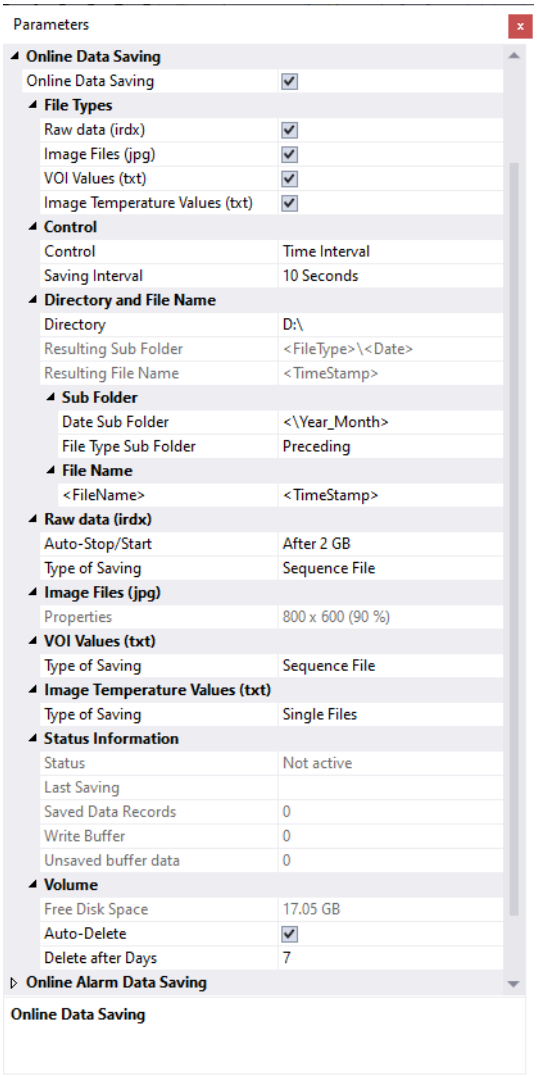
- Save every image
- By time interval
- By image distance (e.g. every 5th image)
- Manual saving: Triggered by menu **[DATA ACQUISITION > Save Current Image]** or **Toolbar "Data Acquisition"** (see page **104**).
- via IO system control (only for **PYROSOFT** variants with IO function)

For the file name different combinations of name, template, index and timestamp are available.

Using the IO system control, it is possible to save the files in different sub directories that are controlled via the digital inputs. For this the IO system must be configured accordingly. **PYROSOFT** reads the IO channel number and generates a storage name (option **[Control > IO Channel Names]**). This can then be used as part of the folder name (option **[Directory and File Name > Sub Folder > IO Channel Sub Folder]**).

If the file name contains an index or timestamp, then the option **[Auto-Start / Stop]** can be selected for IRDX sequences. Then the file size is limited to the selected size and a new file is started.

If necessary, files that are no longer needed can be automatically deleted by selecting **[Volume> Auto-Delete]** and entering the required retention period.



Online Alarm Data Saving

During online data acquisition, data records giving an alarm (see **VOI Alarm** on page **55** and **VOI Alarm Combination** on page **59**) may be stored automatically on hard disk.

The following data formats are available for online alarm data saving:

- IRDX data (raw data for evaluation with **PYROSOFT**)
- JPG image files of the infrared images
- VOI values as text file
- Image temperature values as text file
- Alarm data with time stamp as log file

The online data saving parameters can be set using **Property Pane "Parameters"** (see page **107**). This is only possible if data acquisition is stopped.

With **Toolbar "Data Acquisition"** (see page **104**) or menu **[DATA ACQUISITION],** online alarm data saving can be activated or deactivated altogether.

In addition, online alarm data saving may be activated or deactivated individually for each VOI alarm or VOI alarm combination, see:

- **Properties of VOI Alarms** on page **55**
- **Properties of VOI Alarm Combinations** on page **60**
- **Property Pane "VOI Lists"** on page **113**

If online alarm data saving is activated, there are various possibilities of setting the saving time interval and the saving file name.

The following options are available for the saving interval:

- Save every image
- By time interval
- By image distance (e.g. every 5th image)

For the file name different combinations of name, template, index and timestamp are available.

If the file name contains an index or timestamp, then the option **[Auto-Start / Stop]** can be selected for IRDX sequences. Then the file size is limited to the selected size and a new file is started.

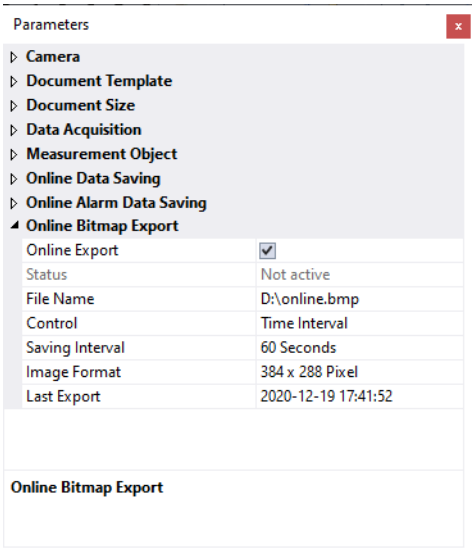
If necessary, files that are no longer needed can be automatically deleted by selecting **[Volume> Auto-Delete**] and entering the required retention period.

Online Bitmap Export

During online data acquisition, the online bitmap export allows an automatic export of the active main image window into an image file (BMP, GIF, JPG, PNG, TIFF).

The formatting of the exported views (margins, company logos, title, scale, subtitle) can be set in program settings (see **View for Full Screen, Copy, Printing, Export** on page **96**).

Online bitmap export can be activated, deactivated and customized in **Property Pane "Parameters"** (see page **107**).



The online bitmap export can be done by time interval.

It can also be triggered by a connected IO system.

If controlled by an IO system, the saving file name is derived from the preset fix file name and the channel number of the input channel.

CHAPTER 6

Internal Image Memory of a Portable Camera

Reading and deleting the internal image memory of a portable camera with **PYROSOFT Professional**.

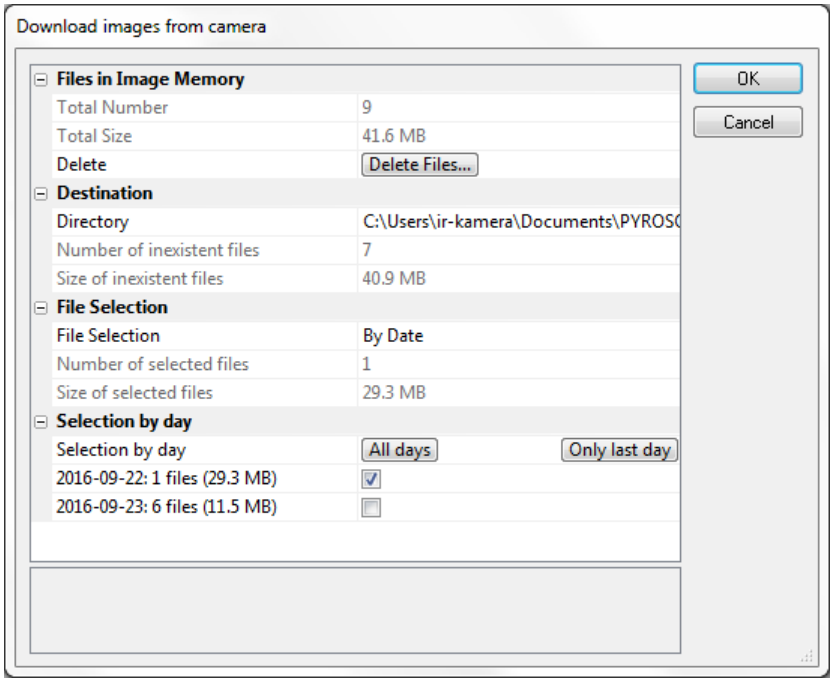
In this Chapter

Readout Image Memory

In order to work with the files in the internal image memory of a portable camera they have to be downloaded to the hard drive first.

For that purpose, connect the portable camera to the computer and start **PYROSOFT Professional**. A camera search will be carried out automatically after the start of program. Alternatively the camera search can be started using menu item **[FILE > New: Online]** or the button **[New]** in the **Toolbar "Standard"** (see page 103).

If a portable camera with internal image memory is found by the camera search procedure, the **dialogue "Download images from camera"** will open automatically:



Here choose the desired files to download from the internal image memory of the camera to the hard drive.

Alternatively, the dialogue can be opened using **Toolbar "Image Memory"** (see page 103) or menu item **[FILE > Image Memory > Readout]**.

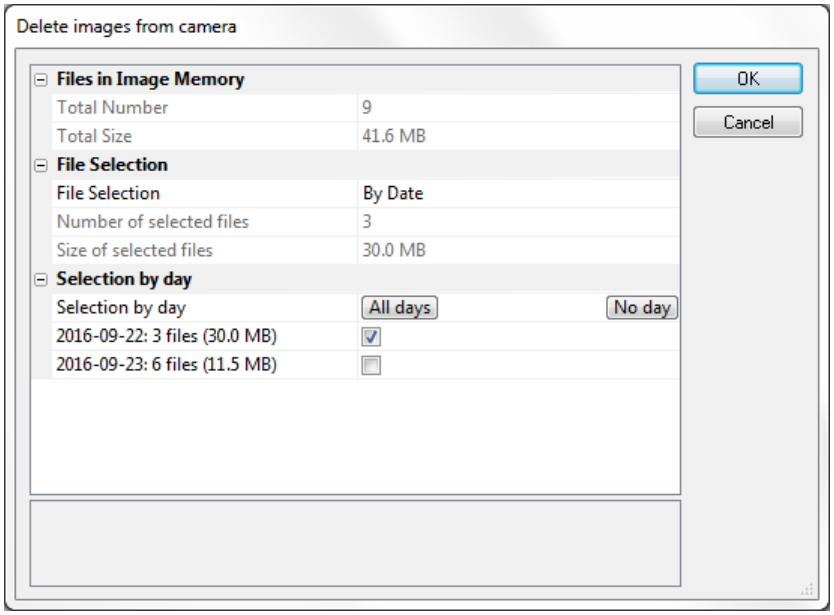
Downloading the images can take up to several minutes, depending on the number of images and the camera type.

After the download of the specified files is finished, the last transferred file is opened automatically and can now be edited and analyzed as necessary (see **Data Analysis and Presentation** on page **33**).

The other transferred files can be opened using menu item **[FILE > Open]** or the arrow buttons in **Toolbar "Image Memory"** (see page **103**).

Delete Images

It is possible to delete all or individual images from the internal image memory of the camera using **Toolbar "Image Memory"** (see page **103**), menu item **[FILE > Image Memory > Delete]** or the button **[Delete Files]** in the **"Download images from camera" dialogue**.



Deleting the images can take up to several minutes, depending on the number of images and the camera type.

CHAPTER 7

Data Analysis and Presentation

PYROSOFT Professional features various possibilities to display and analyze data.

In this Chapter

Scaling and Color Bars

In **Property Pane "Scaling"** (see page **109**), the preset scaling and coloring of the active image window is displayed and can be changed.

Full Screen View

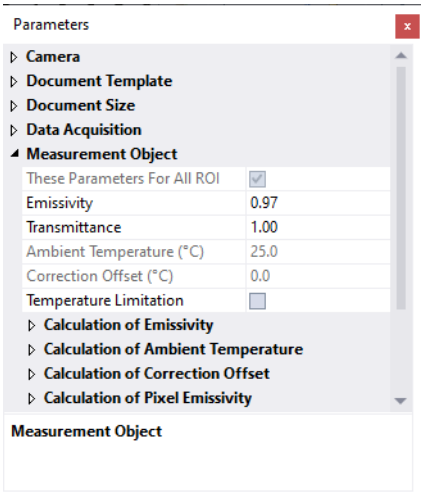
The active image window can be displayed in full screen view by using menu item **[VIEW > Full Screen]** or **Toolbar "Standard"** (see page **103**).

To quit full screen view use "Esc" or double-click on the image. "Print" prints directly out of the full screen view.

The full screen view settings (including the full screen program start) can be modified with menu item **[Extras > Options]** (see **Program Settings** on page **95**).

Measurement Object

Measurement object parameters are displayed in **Property Pane "Parameters"** (see page **107**) and may be modified.



By default, the measurement object parameters are adopted by each ROI.

If option "These Parameter for all ROI" is deactivated, the measurement object parameters can also be set individually for each ROI, see **Measurement Object Inside a ROI** on page **44**.

Emissivity, Transmittance, Ambient Temperature

The set emissivity defines the ability of the measurement object to absorb and emit infrared radiation. The optimum value of 1.00 will not be reached by real matter. A part is reflected by the environment or transmitted through the measurement object.

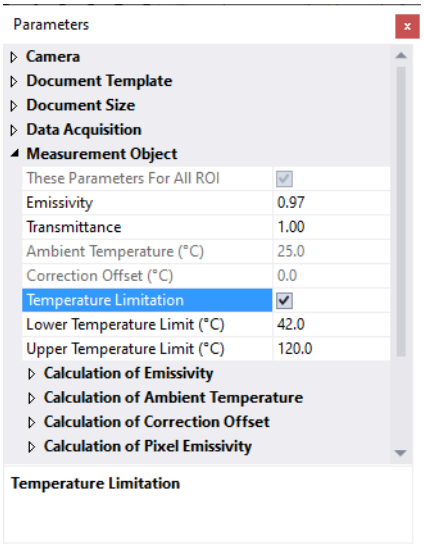
To get a correct temperature measurement, this interference has to be considered.

The set transmittance depends on the distance and the medium between the measurement object and the camera. This way, a filter may be factored in.

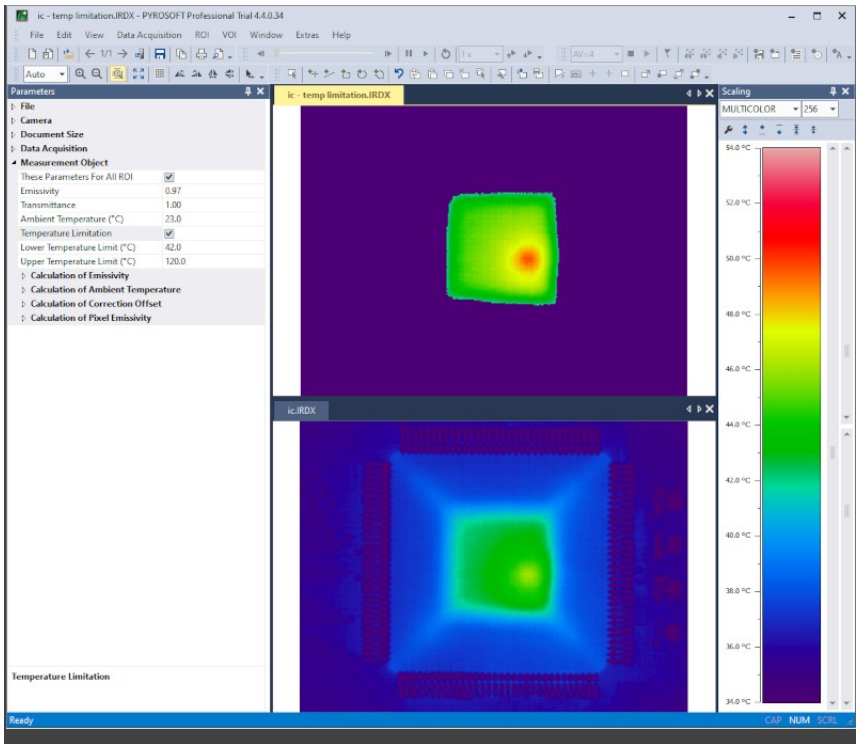
Temperature Limitation

Temperature limitation determines the range of processed and displayed temperature values. By default, the temperature limitation is corresponding to the set measurement range.

A temperature limitation can be set to hide certain temperature values (e.g. background temperatures). For this purpose fixed temperature limits or variable limits (related to a VOI) are available.



Example: Two images, one with a temperature limitation range from 42°C to 120° (above), one without temperature limitation (bottom).



Calculation of Emissivity

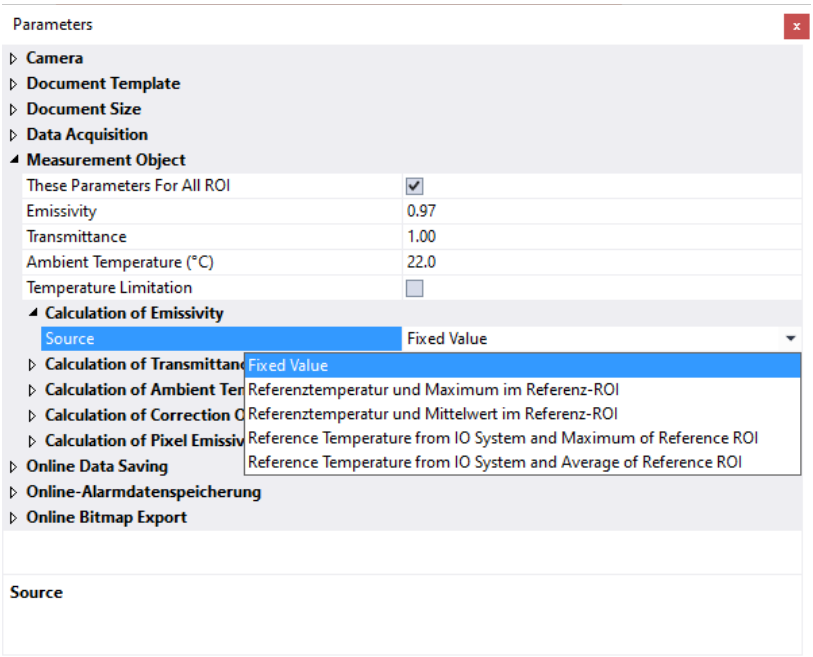
By comparing a reference temperature with the measured temperature values, an automatic calculation of emissivity can be done.

The following options are available:

- Fixed value
- Comparison of the average or maximum temperature in a reference ROI with a static reference value
- Comparison of an external reference temperature from an IO system with an ROI reference value: (only if IO system use is supported)
- Comparison of an external reference temperature from a pyrometer with an ROI reference value: (only if IO system use is supported)

The following requirements must be met for the use of a reference temperature:

- Applicable only in the main image, not for difference or reference image
- A ROI has to be defined as reference ROI (see **Properties of ROI** on page **43**).
- The option **[Measurement Object> These Parameters For All ROI]** has to be activated.
- Applicable only if the reference temperature is not already used elsewhere (calculation of transmittance, ambient temperature,...)



In case of using the IO system the following requirements must be met:

- An analog input of the IO system has to be configured as "Reference temperature"

Calculation of Transmittance

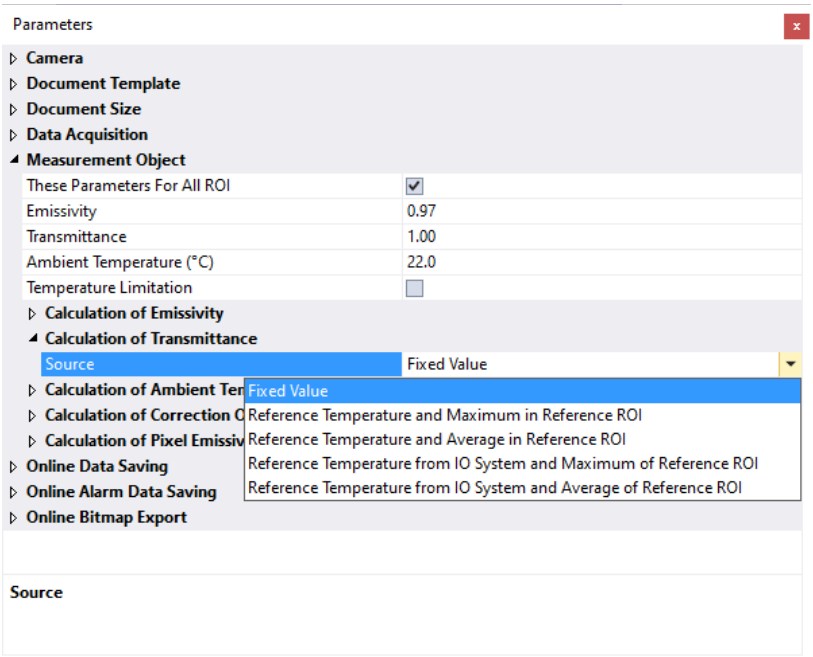
By comparing a reference temperature with the measured temperature values, an automatic calculation of transmittance can be done.

The following options are available:

- Fixed value
- Comparison of the average or maximum temperature in a reference ROI with a static reference value
- Comparison of an external reference temperature from an IO system with an ROI reference value: (only if IO system use is supported)

The following requirements must be met for the use of a reference temperature:

- Applicable only in the main image, not for difference or reference image
- A ROI has to be defined as reference ROI (see **Properties of ROI** on page **43**).
- The option **[Measurement Object> These Parameters For All ROI]** has to be activated.
- Applicable only if the reference temperature is not already used elsewhere (calculation of transmittance, ambient temperature,...)



In case of using the IO system the following requirements must be met:

- An analog input of the IO system has to be configured as "Reference temperature"

Calculation of Ambient Temperature

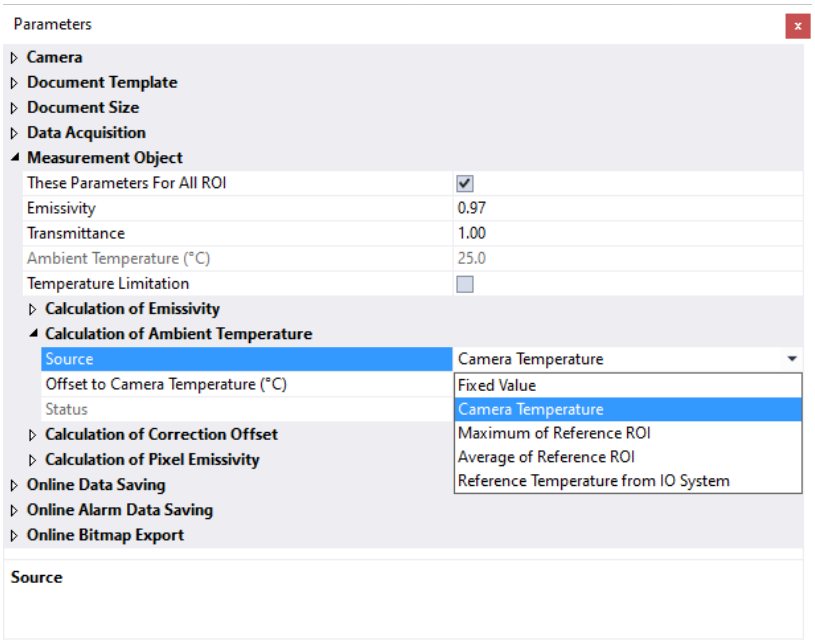
By comparing a reference temperature with the measured temperature values, an automatic calculation of transmittance can be done.

The following options are available:

- Fixed value
- Camera temperature (with optional offset)
- Maximum of reference ROI
- Average of reference ROI
- Reference temperature from IO System (only if IO system use is supported)

The following requirements must be met for the use of a reference temperature or reference ROI:

- Applicable only in the main image, not for difference or reference image
- A ROI has to be defined as reference ROI (see **Properties of ROI** on page **43**).
- The option **[Measurement Object> These Parameters For All ROI]** has to be activated.
- Applicable only if the reference temperature is not already used elsewhere (calculation of transmittance, ambient temperature,...)



In case of using the IO system the following requirements must be met:

- An analog input of the IO system has to be configured as "Reference temperature"

Note on the use of a reference ROI:

For the calculation of ambient temperature, the value from the last calculation of the reference ROI is used. The reference ROI is then subsequently recalculated with the new ambient temperature value. Due to the possible change of the ambient temperature, the temperature values of the reference ROI can change again, i.e. an iterative adjustment takes place.

Calculation of Correction Offset

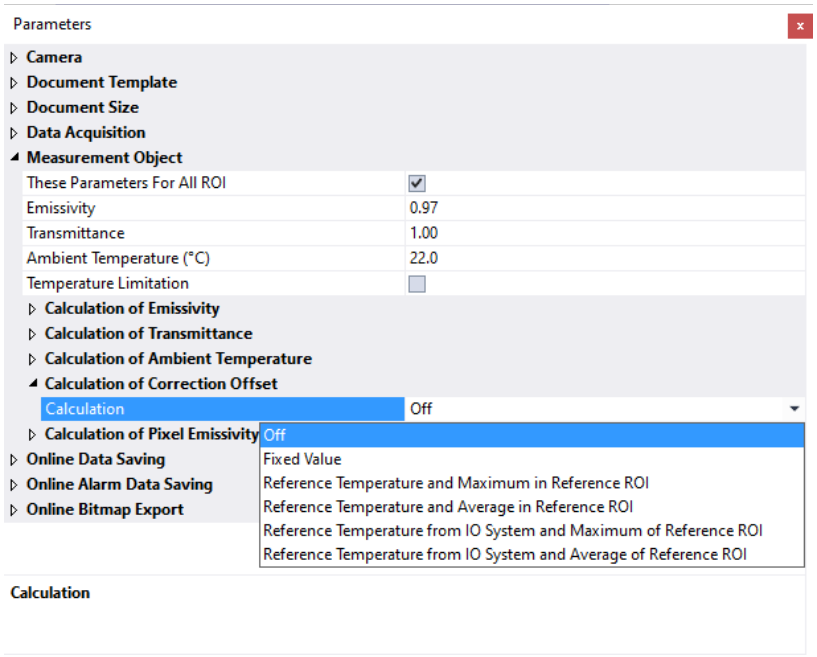
By comparing a reference temperature with the measured temperature values, an automatic offset correction can be done.

The following options are available:

- Fixed value
- Comparison of the average or maximum temperature in a reference ROI with a static reference value
- Comparison of an external reference temperature from an IO system with an ROI reference value: (only if IO system use is supported)

The following requirements must be met for the use of a reference temperature:

- Applicable only in the main image, not for difference or reference image
- A ROI has to be defined as reference ROI (see **Properties of ROI** on page **43**).
- The option **[Measurement Object> These Parameters For All ROI]** has to be activated.
- Applicable only if the reference temperature is not already used elsewhere (calculation of transmittance, ambient temperature,...)



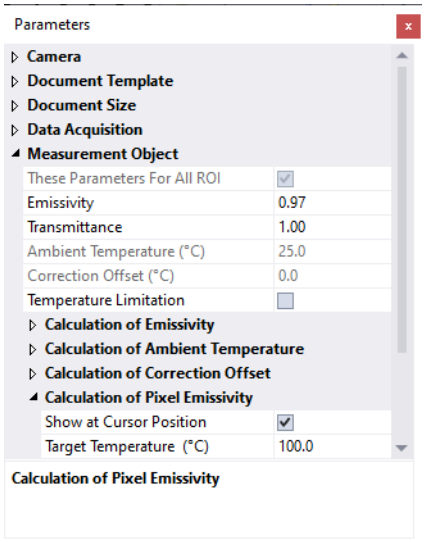
In case of using the IO system the following requirements must be met:

- An analog input of the IO system has to be configured as "Reference temperature"

Calculation of Pixel Emissivity

This feature allows to calculate the emissivity by using a test object with known temperature.

If activated, the point temperature (see **Toolbar "View"** on page **104**) shows the calculated emissivity for every pixel based on the known target temperature of the test object.



ROI – "Region of Interest"

A ROI ("Region of Interest") is a specific region in the image window, whose measurement values may be used for viewing or further analysis.

The following ROI types are supported (max. 1000 per type and image window):

- ROI point (value)

- ROI line, ROI polyline (a non-closed polygon), ROI rectangle, ROI ellipse/circle, ROI polygon (each with minimum, maximum, average, standard deviation and number of pixel)

The **Toolbar "ROI"** (see page **105**) contains helpful buttons for working with ROI, see menu **[ROI]**.

Insert a ROI

To insert a ROI, the ROI type has to be selected first by using toolbar (or menu) **[ROI]**. Then, using the mouse, the ROI can be inserted in the image window.

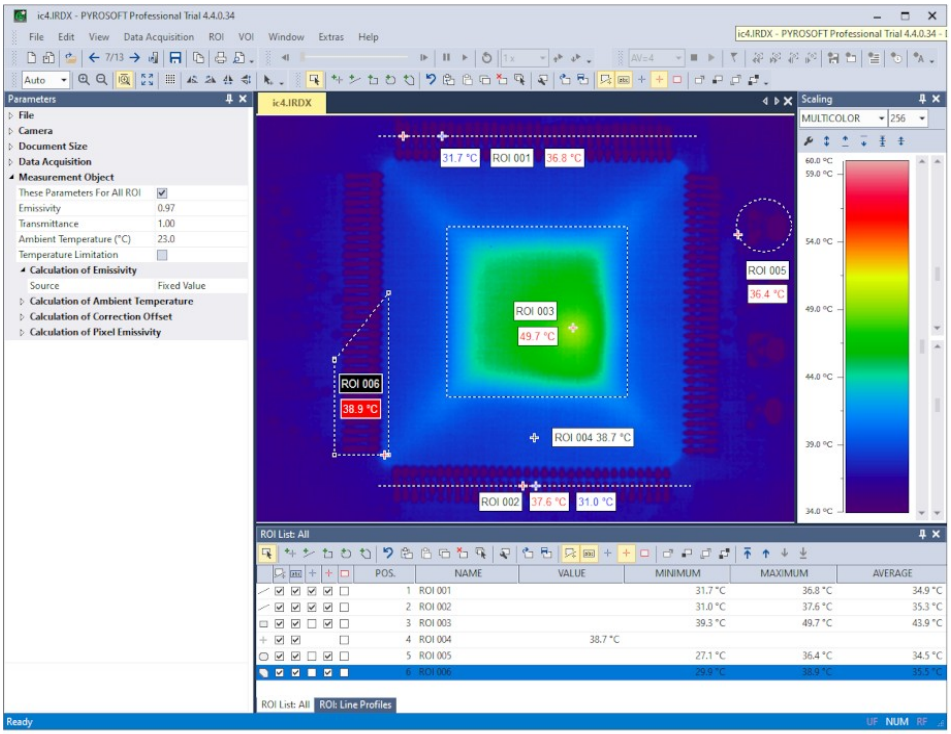
- ROI point:
  Left-click
- ROI line, ROI rectangle, ROI ellipse/circle:
  Left-click to set the starting point, drag until desired size is reached, release left mouse button to set the end point
- ROI polyline or ROI polygon:
  First left-click to set the starting point, drag until desired position for next point is reached, second left-click to set next point, repeat until the desired number of vertices is reached, end with right-click.

After inserting an ROI, the mode changes automatically to "Select", i.e. the inserted ROI may be moved or modified.

For inserting a new ROI, the ROI type has to be selected again.

After inserting an ROI, it is displayed in the image window with the preset label. The labels associated with the ROI can be moved freely.

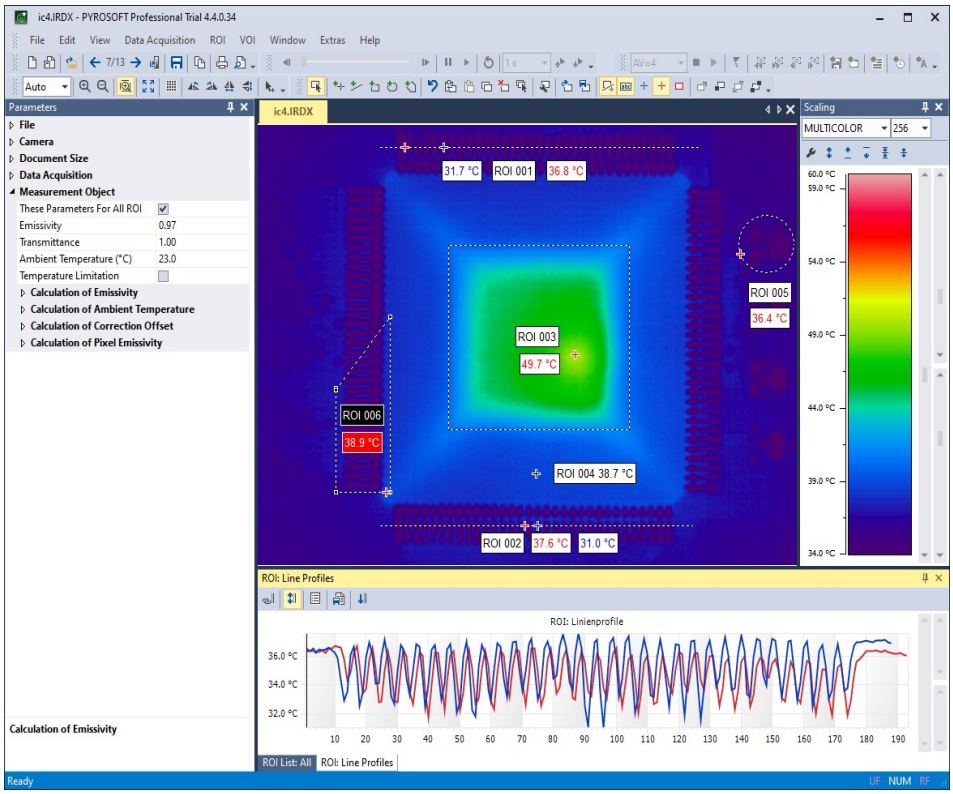
To change the labeling, see **Show ROI in the Image Window** on page **45**.



The property pane "ROI List: All" (see **Property Pane "ROI Lists"** on page **111**) displays a list of all ROI with their current values.

Also, it is possible to display separate ROI lists for points, lines and areas.

For ROI type line, the **Property Pane "ROI: Line Profiles"** (see page **111**) displays line profiles:



Working with ROI

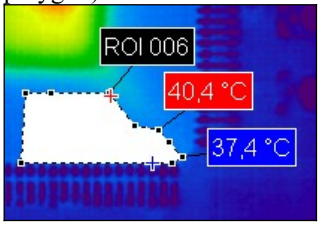
The following ways are available to work with ROI:

- Menu **[ROI]**
- Property Pane: Left double-click opens the dialog box for setting the ROI properties, see **Properties of ROI** on page **43**.
- Image Window: Right-click on ROI opens a drop down menu
- **Toolbar "ROI"** (see page **105**)
- **Property Pane "ROI Lists"** (see page **111**)

The following functions are available:

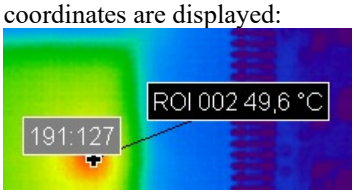
- Select ROI:
  A specific ROI can be selected with a left-click in the image window or in the ROI list.
  In image window, the mode "Select ROI" must be activated.
  By holding the "Shift" key during selection a multi-selection of ROI can be done.

  By holding the "Ctrl" key before selecting a ROI in the image window, the ROI body is filled white (with ROI types: rectangle, ellipse/circle and polygon).

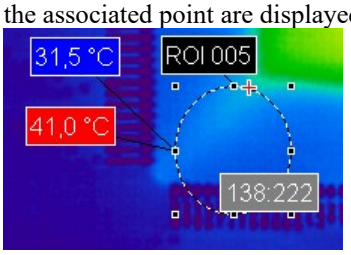


- Select All:
  With this menu function, all ROI can be selected.
- Change the position of a ROI point by using the mouse:
  By holding the "Ctrl" key during changing the position of an ROI point, the

coordinates are displayed:



- Change the size of an ROI:
  By holding "Ctrl" key during changing the size of an ROI, the coordinates of the associated point are displayed:



  By dragging one of the four vertices, the size of a rectangle, an ellipse or a circle changes proportionally.
- Move ROI by using the mouse:
  The mouse is used to move all selected ROIs.
- Adding a vertex to a polyline or polygon:
  By pressing the Shift key and clicking on the desired position, an additional vertex can be inserted. The prerequisite is that the ROI is selected.
- Delete a vertex of a polyline or polygon:
  By pressing the Shift key and clicking on the selected vertex, it can be removed.
- Undo ROI Action:
  In menu or toolbar.
- Copy selected ROI:
  With this menu- or toolbar function, a selected ROI can be copied to the clipboard.
- Insert ROI:
  With this menu- or toolbar function, ROI can be inserted from the clipboard into the active image window.
- Delete selected ROI:
  With this menu- or toolbar function or the "Delete" key, the selected ROI can be deleted.
- Properties:
  With this menu- or toolbar function, the dialog box **Properties of ROI** (see page **43**) can be accessed.
- Layer:
  If several ROI overlap (e.g. a point and a rectangle), their layer may be modified with the corresponding menu- or toolbar functions, changing the list order in **Property Pane "ROI List"**.
- Groups:
  Defining ROI Groups, see **Groups of ROI** on page **46**.
- Move All ROI:
  With **Toolbar "ROI: Move All"** (see page **106**) or menu **[ROI > Move All]**, all ROI are moved one pixel, even if they are not selected.
- Load from File:
  Menu item **[ROI > Load from File]** loads a ROI list from an external file.
- Save to File:
  Menu item **[ROI > Save to File]** stores the current ROI list in an external file.

Properties of ROI

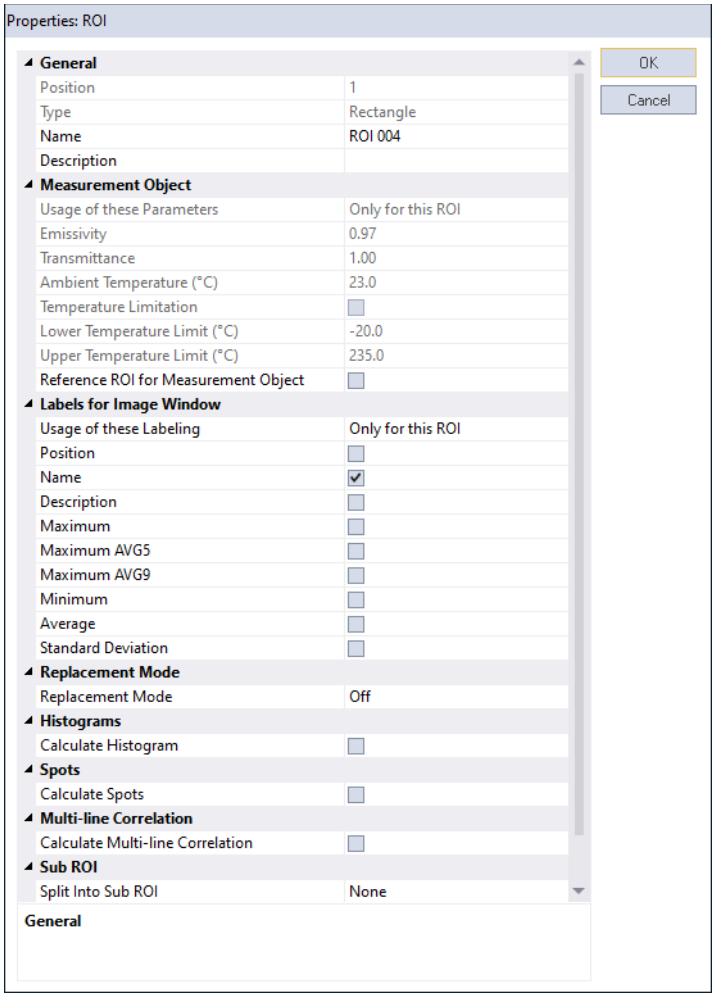
The ROI properties dialog box may be opened in the following ways:

- Image Window: Left double-click inside a ROI

- Image Window: Right-click inside a ROI, menu item **[Properties]**
- **Toolbar "ROI"** (see page **105**)
- **Property Pane "ROI Lists"** (see page **111**): Left double-click on the row of the desired ROI

The following categories are available:

- General
- Measurement Object (see **Measurement Object Inside a ROI** on page **44**)
- Labels for Image Window (see **Show ROI in the Image Window** on page **45**)
- Histograms (not available for ROI points; see **Histograms** on page **64**)
- Calculation of Spots (not available for ROI points or lines; see **Spots** on page **66**)
- Multi line correlation (for ROI rectangles only; see **Multi-line Correlation** on page **69**)
- Sub ROI (for ROI rectangles only; see **Splitting into Sub-ROI** on page **46**)
- Calculation of FFT (for ROI lines only; see **FFT** on page **68**)



Measurement Object Inside a ROI

Emissivity, transmittance, ambient temperature and temperature limitation can be set for each ROI as follows:

- 1. The settings are adopted from the image window (default)
- 2. Each ROI has individual specific values.

If specific values should be applied for each ROI, the option "These Parameter for All ROI" in category "Measurement Object" in **Property Pane "Parameters"** has to be deactivated (see **Measurement Object** on page **34**).

In connection with the **Calculation of Emissivity** (see page **36**) and the **Calculation of Correction Offset** (see page **39**), a specific ROI can be activated as a reference ROI for the measurement object.

Show ROI in the Image Window

With menu **[VIEW]** or **Toolbar "ROI"** (see page **105**) the display of the ROI in the image window may be configured.

The following settings are available:

- Show/Hide the ROI altogether
- Show/Hide the ROI Labels
- Show/Hide ROI Minimum
- Show/Hide ROI Maximum
- Show/Hide ROI Alarm, see **Show Alarms in Image Window** on page **61**.

The ROI labels in the image window may be configured for each ROI separately:

- With dialog box **Properties of ROI** (see page **43**)
- With **Property Pane "ROI Lists"** (see page **111**)

To show or hide the connecting lines between the ROI and their labels, use menu item **[EXTRAS > Options]** (see **Program Settings** on page **95**).

Also, it is possible to define groups of ROI to differentiate them in the display (see **Groups of ROI** on page **46**). The functions for displaying the ROI then only work for the selected group.

Mirrored ROI

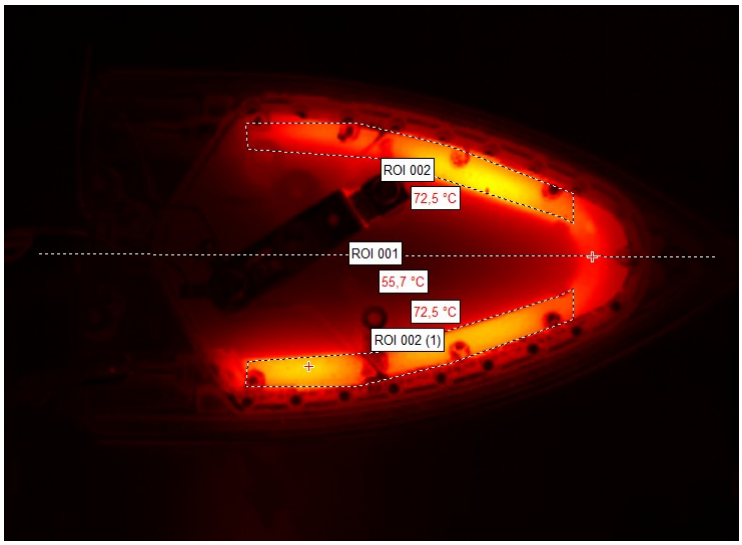
When mirroring ROIs, a ROI line is used as the mirror axis. Any number of ROIs can be mirrored on this axis. The function is available for all ROI types. However, rectangles and ellipses can only be mirrored at horizontal or vertical axes.

Course of action:

Select the ROI to be mirrored and the ROI line to serve as the mirror axis. Selecting multiple ROI is possible by holding down the Shift key.

Then use the right mouse button or the menu **[ROI]** to select the **[Mirrored Copy]** option.

Example: Mirroring of a polygon



When mirroring a line, the ROI line that is at the top of the ROI list is used as mirror axis (see **Property Pane "ROI Lists"** on page **111**).

Groups of ROI

To differentiate the ROI, it is possible to define up to eight ROI groups and display them all or separately, see menu **[ROI > Groups]** and **Toolbar "ROI: Groups"** (see page 105).

Splitting into Sub-ROI

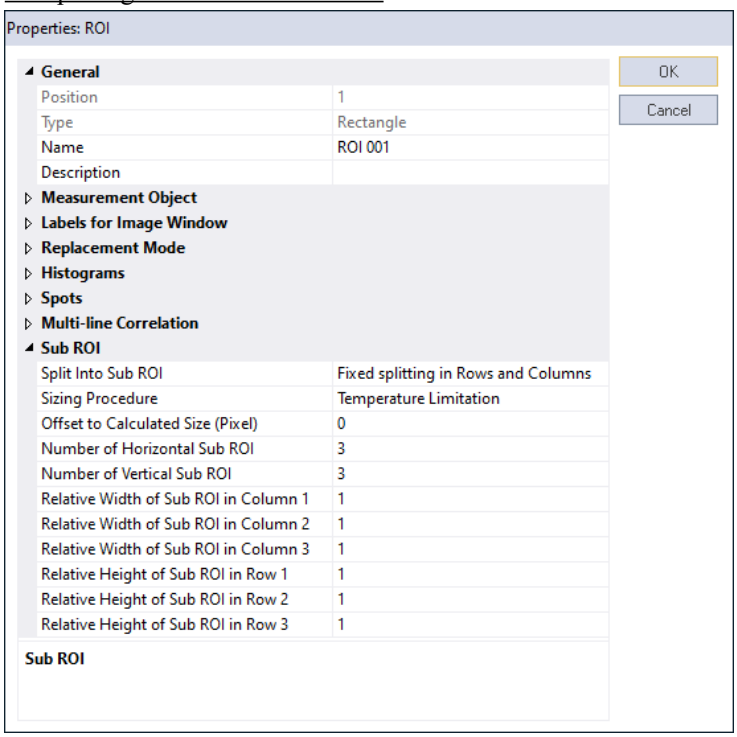
The ROI type "Rectangle" can be automatically split into sub-ROI. A maximum of 256 sub-ROI per rectangle ROI can be defined.

The associated ROI and sub-ROI are indicated in the image view and in the ROI lists (see page 111) as follows:

- Base-ROI (rectangle): This ROI defines the outer border, i.e. the expectancy range of the measurement object.
  Example: "ROI 001"
- "ROI 001.0": Master-ROI with the current calculated size.
  When an "Offset to Calculated Size" and/or a temperature limitation is defined, the master-ROI can differ from the base-ROI.
  The "Offset" always influences the calculated size of the master-ROI, at which the master-ROI never exceeds the dimensions of the base-ROI.
- "ROI 001.1" to "ROI 001.xxx"
  The sub-ROI, according to the selected number.

The following 2 ways of splitting are available:

Fix splitting into columns and rows



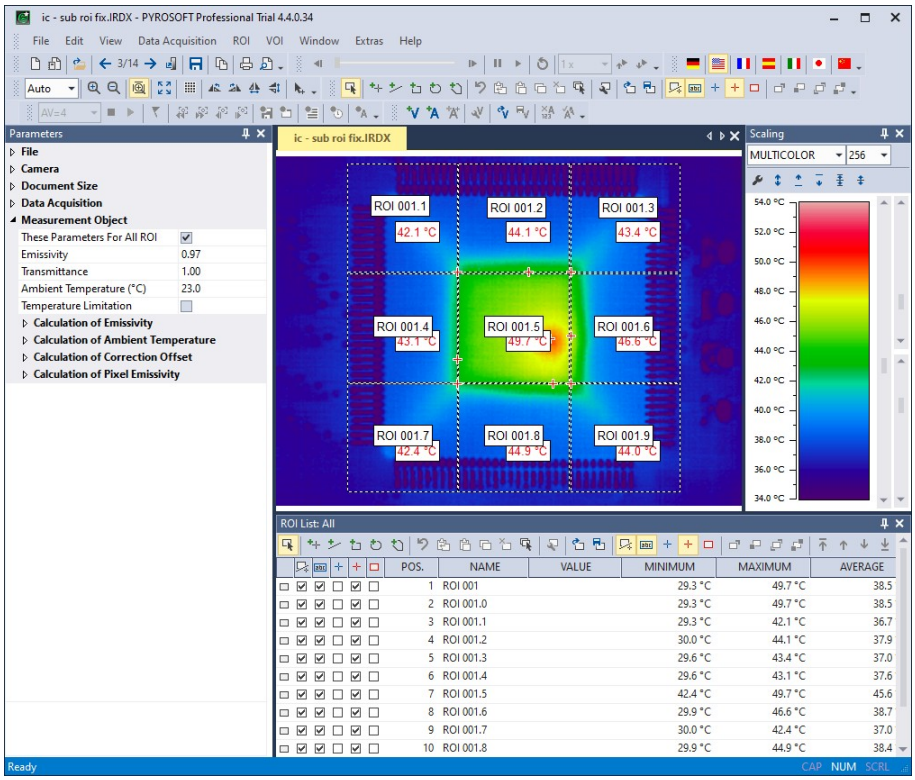
Using the fix splitting into columns and rows, the number of sub-ROI is defined according to the selected number of horizontal and vertical sub-ROI.

The relative column width and the relative row height (in relative values, not percent), referring to the calculated master-ROI, can be selected for each row and column.

Examples for relative values:

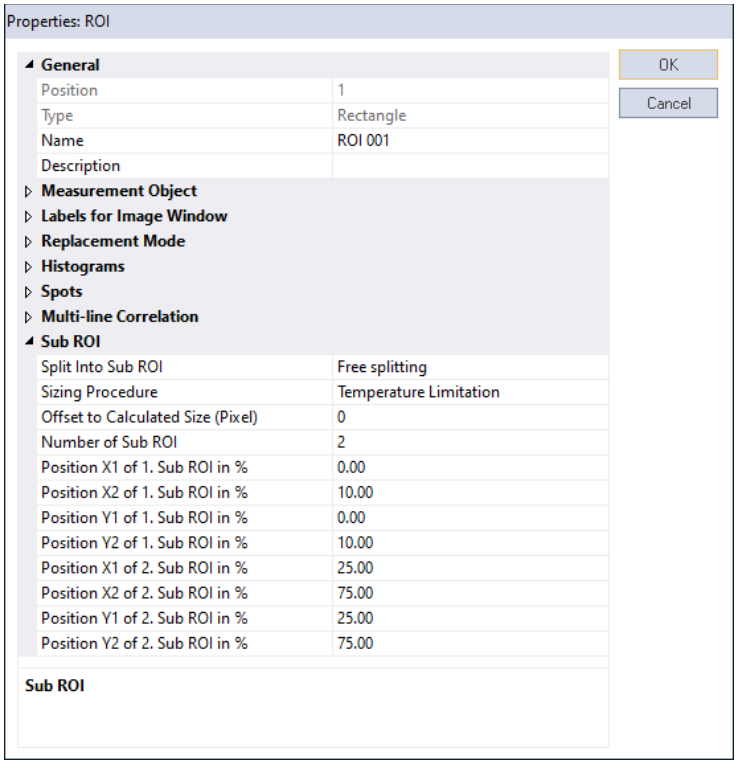
- 3 sub-ROI, each with value 1
  - Total value: 3
  - per sub-ROI: value 1, therefore 1/3 (33,3 %) of the master-ROI

- 2 sub-ROI, value of first sub-ROI: 1, value of second sub-ROI: 3
  - Total value: 4
  - First sub-ROI: value 1, therefore 1/4 (25 %) of the master-ROI
  - Second sub-ROI :value 3, therefore 3/4 (75 %) of the master-ROI

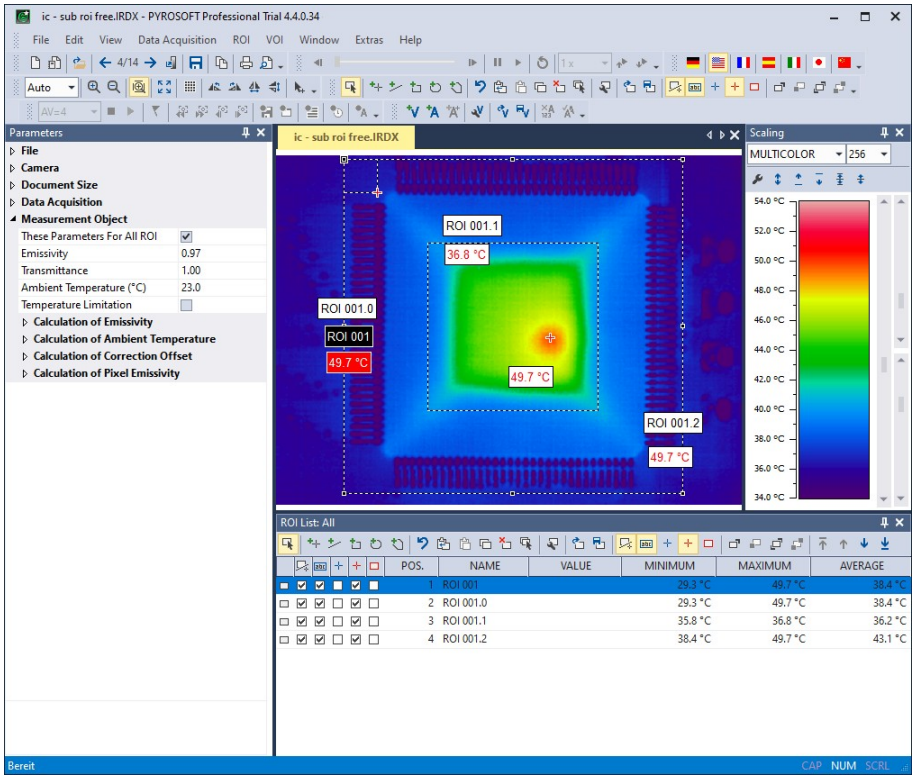


Example: Fix splitting into columns and rows

Sub-ROI with unrestricted splitting



Using the unrestricted splitting, it is possible to set the values for each sub-ROI as value in percent based on the current calculated size of the master-ROI. This way, it is possible for sub-ROI to overlap.



Example: Sub-ROI with unrestricted splitting

Please note:

When the sub-ROIs are created, the properties of the base-ROI are adopted for all sub-ROIs. Subsequent changes to the base-ROI, however, do not affect the sub-ROI. You

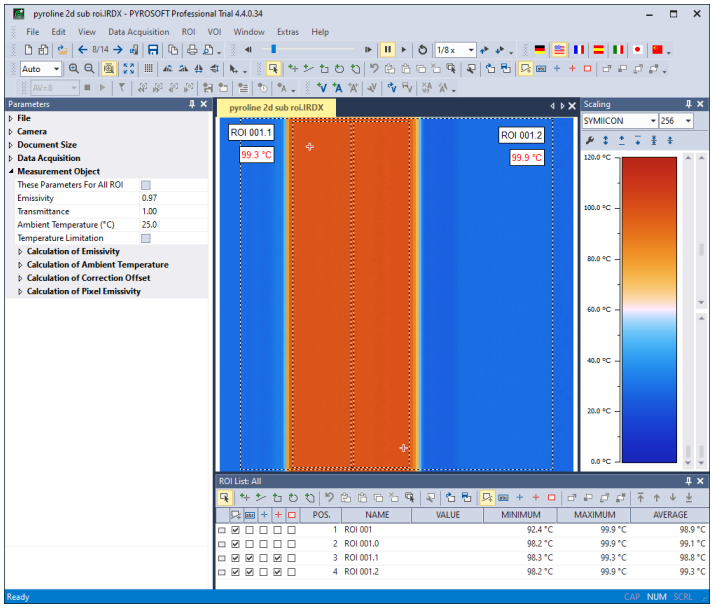
should therefore define the desired properties of the sub-ROI in the base-ROI before they are created.

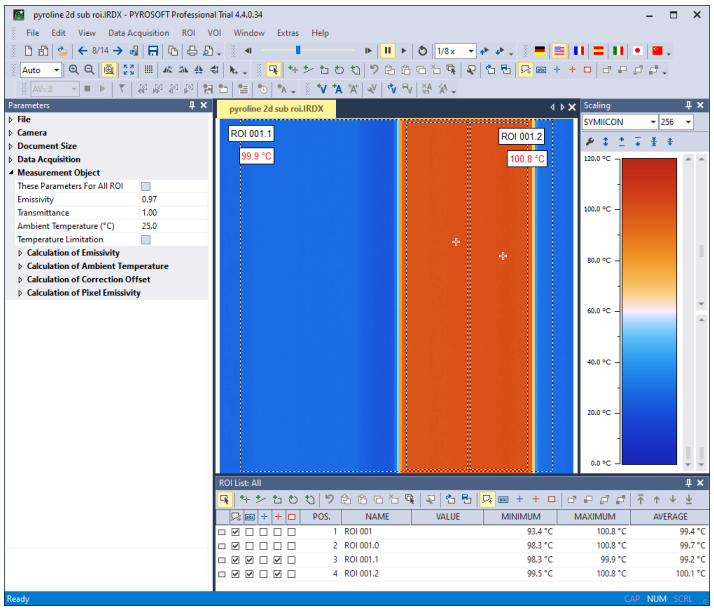
Self-Adjusting ROI

By using the **Splitting into Sub-ROI** option (see page 46) it is possible to create self-adjusting ROI. These are able to track a moving measurement object in the image.

This is done either by defining a temperature limitation in the image (see page 35) or in the ROI (see page 44) or by edge detection.

Example: Calculating the averages in the left and the right half of a measurement object, the localization of the object is non-stationary:





Course of action:

The expectancy range for the ROI is defined by the base-ROI. Insert a rectangular ROI at the desired location.

Divide the base-ROI into sub-ROI (fixed or free) according to the chapter **Splitting into Sub-ROI** (see page 46). The resulting sub-ROI fill the base-ROI.

Sizing by temperature limitation:

Select "Temperature Limitation" as sizing procedure and check "Temperature Limitation" further up in the "Properties: ROI" dialog. Specify reasonable temperature

limits for detecting the target (e.g. lower temperature limit 90°C and upper temperature limit 110°C for a target that is hot around 100°C).

Size adjustment by edge detection:

Select "Edge Detection" as the sizing procedure.

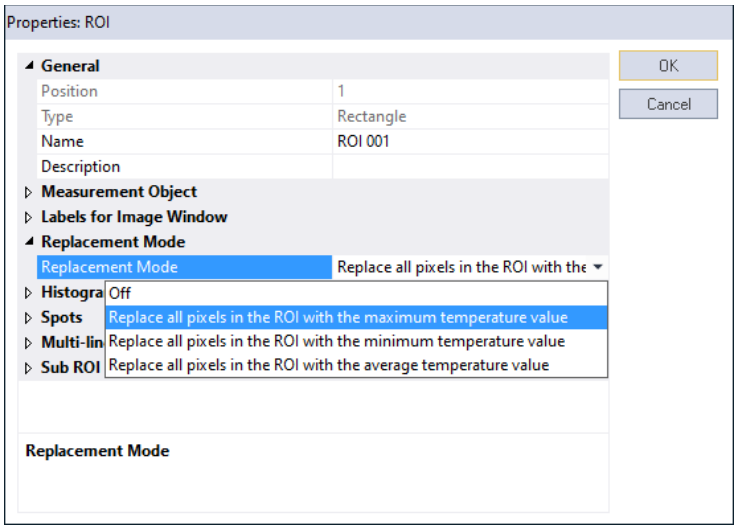
Edge detection evaluates the temperature differences between neighboring pixels on the horizontal and vertical centerline of the ROI. Based on the temperature maximum of the respective line, the left and right maximum absolute value of the slope is set as the edge or boundary of the sub-ROI. Temperature differences or slopes below the specified values "Minimum Absolute Value of Horizontal Slope" and "Minimum Absolute Value of Vertical Slope" are not taken into account in the calculation. By entering a usually unattainable high value (e.g. 1000), edge detection can be switched off separately for each direction (horizontal or vertical).

The sub-ROI now adjust their size and position automatically.

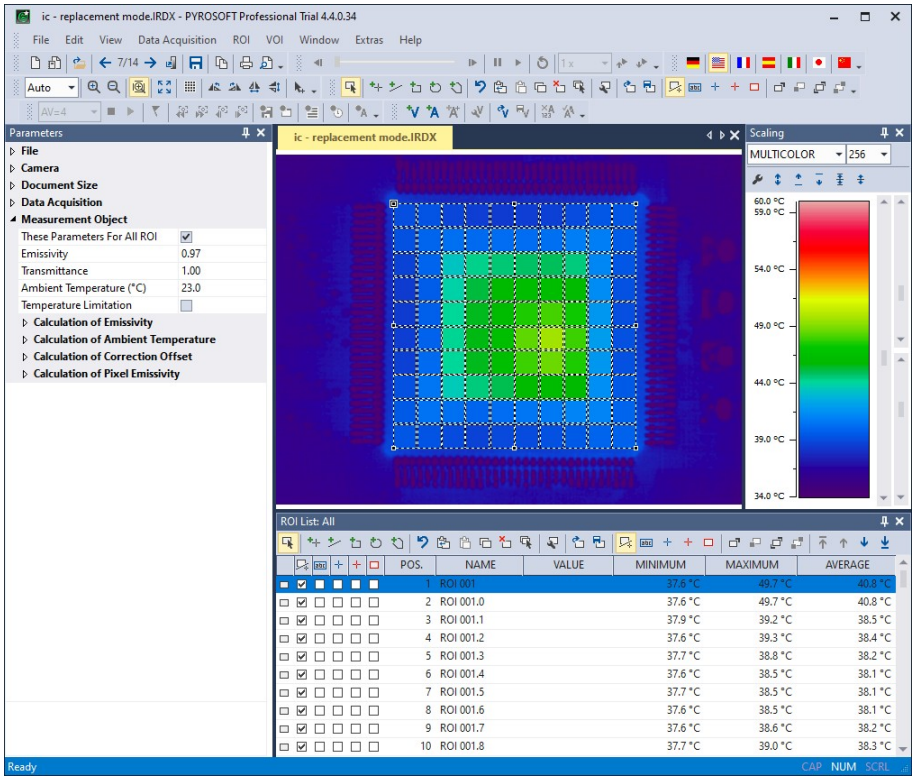
The value "Offset to Calculated Size" (see **Splitting into Sub-ROI** on page **46**) can be applied to exclude or reduce boundary effects at the borders between valid and invalid temperature values.

Replacement Mode

The replacement mode is visual support for the optical assessment of infrared images. For this, each pixel in the ROI is replaced by the maximum / minimum / average temperature, making it easier to visually estimate.



Example: Rectangular ROI with 10*10 sub-ROI, all with replacement mode using the temperature maximum



Exporting and Importing ROI

Using menu item **[ROI > Save To File]** it is possible to export the defined ROI and save them to a file (*.roi). If required, the saved ROI settings can be reloaded from the ROI file into any open IRDX file (menu item **[ROI > Load From File]**).

VOI – "Value of Interest"

A VOI is a "Value of Interest", which establishes a basis for a calculated value or parameter, an alarm, an outgoing analog or digital value or a trend chart.

The input value for a VOI can be a specific ROI value or a digital or analog input from an IO system.

The following VOI types are supported:

- VOI value with functions for:
  value, sum, difference, minimum, maximum, average, standard deviation, histogram, product, quotient, constant, minimal/maximal absolute value, et al
- VOI alarm with functions for:
  (< threshold), (> threshold), (> threshold 1) AND (< threshold 2), (< threshold 1) OR (> threshold 2), digital input
  each of these thresholds can be fix or variable
- VOI alarm combination with functions for:
  AND, OR, NOT

The **Toolbar "VOI"** (see page **106**) contains helpful functions for working with VOI, see menu **[VOI]**.

VOI Value

Insert a VOI Value

If at least one ROI or any other input value is available for the calculation of a VOI, a new VOI may be created using **Toolbar "VOI"** (see page **106**), menu **[VOI]** or right clicking in the ROI.

The VOI property dialog is opened (see page **52**).

After defining the properties of the new VOI value, it is added to the measurement document.

The property pane "VOI-Lists" (see **Property Pane "VOI Lists"** on page **113**) displays a list of all VOI with their current values.

Furthermore it is possible to show Property Pane "VOI List: Values" listing solely VOI values.

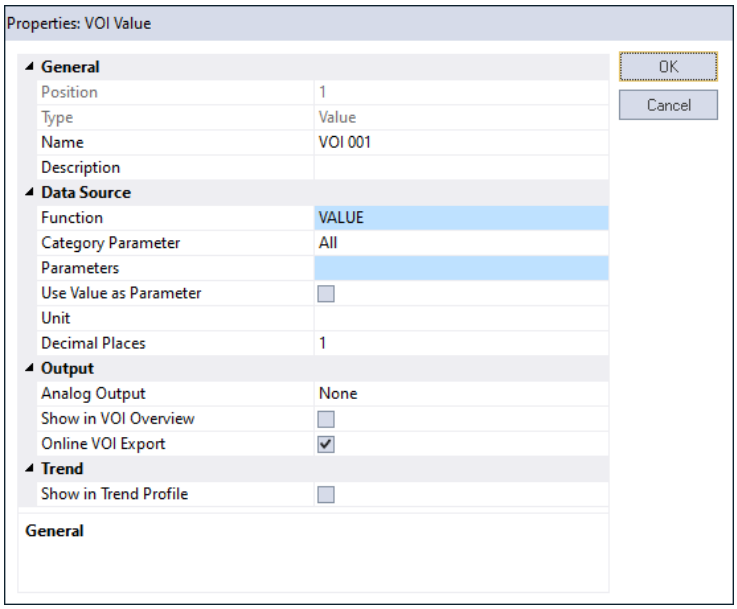
Duplicate an existing VOI value:

In **Property Pane "VOI Lists"** (see page **113**), a right click on the list row duplicates the VOI. Afterwards, the **Properties of VOI Values** may be changed (see page **52**).

Properties of VOI Values

The dialog box for setting the properties of a VOI value can be opened by using:

- Menu item **[VOI > Properties]**
- **Toolbar "VOI"** (see page **106**)
- **Property Pane "VOI Lists"** (see page **113**): Double-click on the row of the desired VOI value



The entries marked in blue are fields that MUST be filled out. The other entries are optional.

Data Source of VOI Values

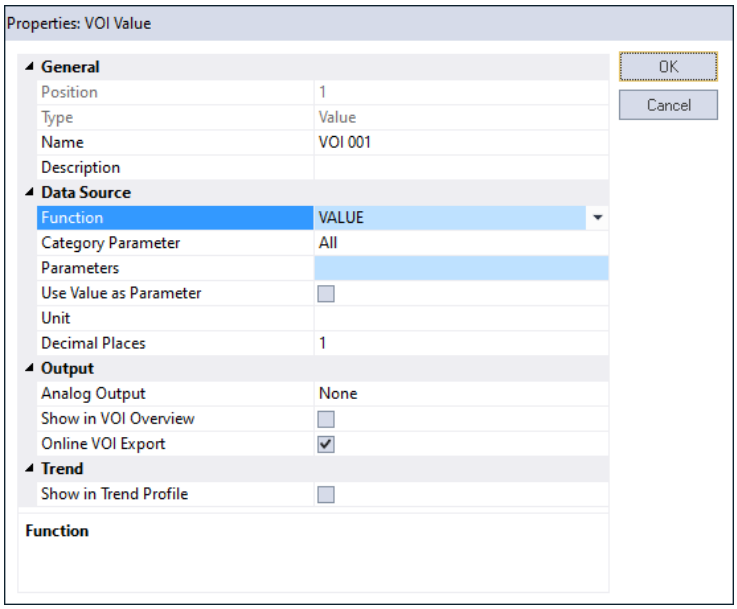
The data source defines the calculation of a VOI value.

Data Source - Functions:

The following functions are supported:

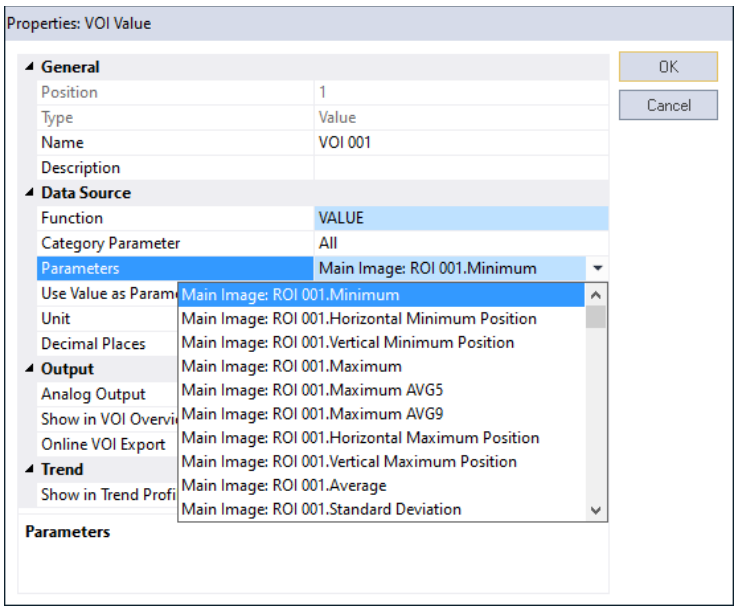
- Value of a single parameter
- Sum of maximal 32 parameters
- Difference of two parameters
- Minimum, maximum, average of maximal 32 parameters
- Standard deviation of maximal 32 parameters
- Histogram functions for absolute or relative numbers of pixel, and one or two fix or variable thresholds (see **Histograms** on page **64**)

- Product of maximal 32 parameters
- Quotient of two parameters
- Constant with one parameter
- QUOTIENT_FUNC1 with 4 parameters:
  (Parameter1 + Parameter2) / (Parameter3 * Parameter4
- QUOTIENT_FUNC2 with 4 parameters:
  (Parameter1 - Parameter2) / (Parameter3 * Parameter4)
- Minimal absolute value of maximal 32 parameters
- Maximal absolute value of maximal 32 parameters
- Absolute value of the sum of maximal 32 parameters
- Absolute value of the difference of maximal 32 parameters
- Spot parameters (Number of Spots, size and position, temperature maximum, see **Spots** on page **66**)
- FFT minimum, maximum or average (see **FFT** on page **68**)
- Line values of a ROI line (the number of pixels is displayed in **Property Pane "VOI Overview: Values"**, for the output of the individual line values see **Output of VOI Values** on page **54**)
  Invalid edge values can be cut off via temperature limitation or edge detection, the boundary is then marked in the image window.
- Correlation of 2 ROI lines
- Multi line correlation (correlation minimum or maximum value, see **Multi-line Correlation** on page **69**)
- Any function containing up to 32 parameters



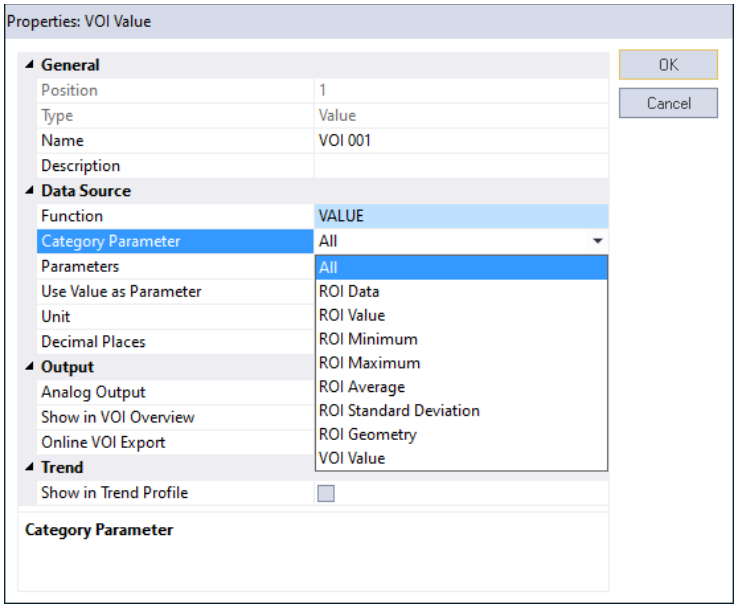
Data Source - Parameters:

All ROI values, a camera temperature or read-in analog values from the IO system or external pyrometers can be used as parameter to calculate a VOI value.



Data Source – Category Parameters:

Use the categories of parameters to simplify choosing a parameter from the drop down box "Parameter". Selecting a parameter category other than "All" shortens the list of offered parameters to an easier manageable level.



Data Source: Use VOI value as parameter:

A calculated VOI value can also be used as parameter for other VOI values as long as the option "Use Value as Parameter" is activated. The associated VOI value is then displayed in the list of parameters for the data source of another VOI.

It is not allowed to interlace the VOI values more than one time.

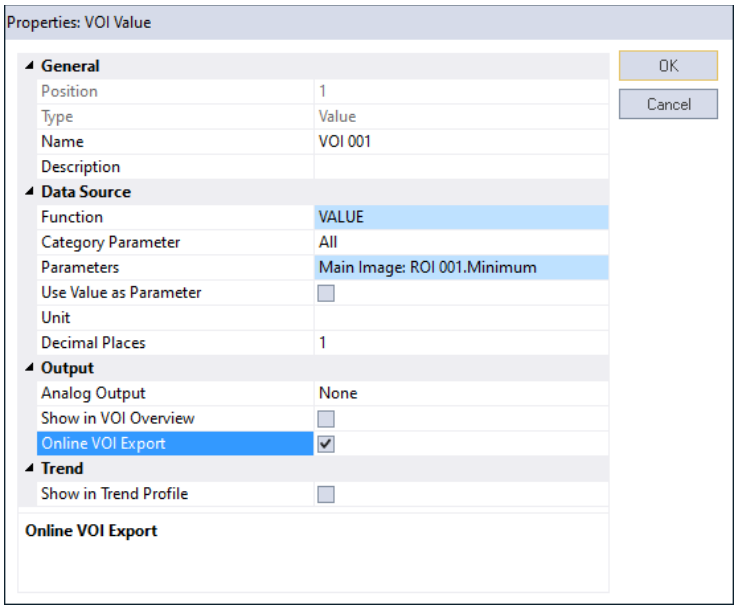
Output of VOI Values

The following online outputs of a VOI value are possible:

- Display in property pane "VOI Overview: Values (see **Property Pane "VOI Overview: Values"** on page **117**)
- Display in the ROI label or as coloring of the associated ROI in the image window:
  In the "Properties: VOI Value" dialog, the "Output > Display in ROI" option must be active.

In dialog box **Properties of ROI** (see page 43) the option "Label for Image Window > VOI Value" or "Appearance > Coloring usingVOI Value" must be activated.

- Output as analog value or data block (line values) to an IO system
- Online VOI export into a text file (see **Online Alarm Data Saving** on page 27)



For exporting the VOI values of an offline image or sequence see **Text Export: VOI** on page 83.

VOI Alarm

Insert a VOI Alarm

With **Toolbar "VOI"** (see page 106) or menu **[VOI],** a new VOI alarm can be created, if at least one VOI value is available. The dialog box for setting the properties of a VOI alarm (see page 55) is opened.

A faster way without previous creation of a VOI value: By right-clicking in an ROI and using the menu item **[Add VOI Alarm]** the required VOI value is created automatically.

The property pane "VOI Lists" (see **Property Pane "VOI Lists"** on page 113) displays the list of all VOI with their current values.

It is also possible to display a separate VOI list for only VOI alarms.

Duplicate an existing VOI alarm:

In **Property Pane "VOI Lists"** (see page 113), a right click on the list row duplicates the VOI. Afterwards, the **Properties of VOI Alarms** may be changed (see page 55).

Properties of VOI Alarms

The dialog box for setting the properties of a VOI alarm can be opened in the following ways:

- Menu item **[VOI > Properties]**
- **Toolbar "VOI"** (see page 106)
- **Property Pane "VOI Lists"** (see page 113): Double-click on the row of the desired VOI alarm

Data Source of VOI Alarms

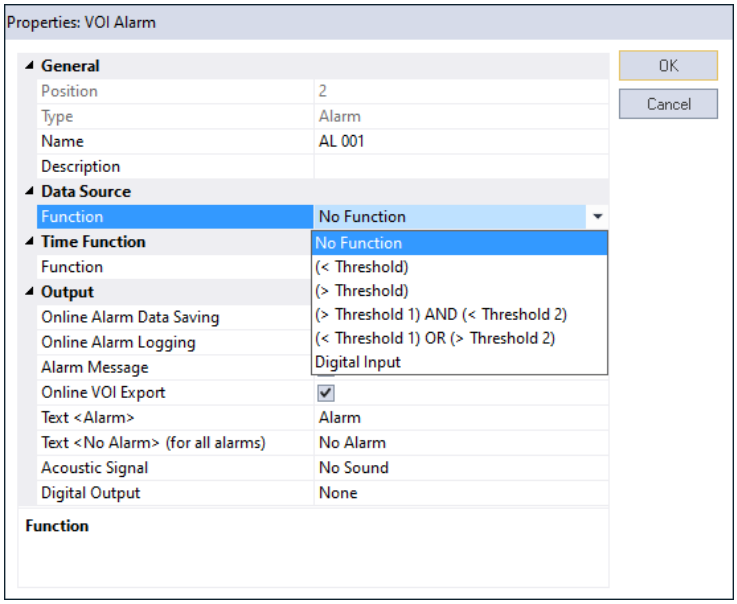
The data source defines the calculation of a VOI alarm.

Data Source - Function:

The following functions are supported:

- (< Threshold)

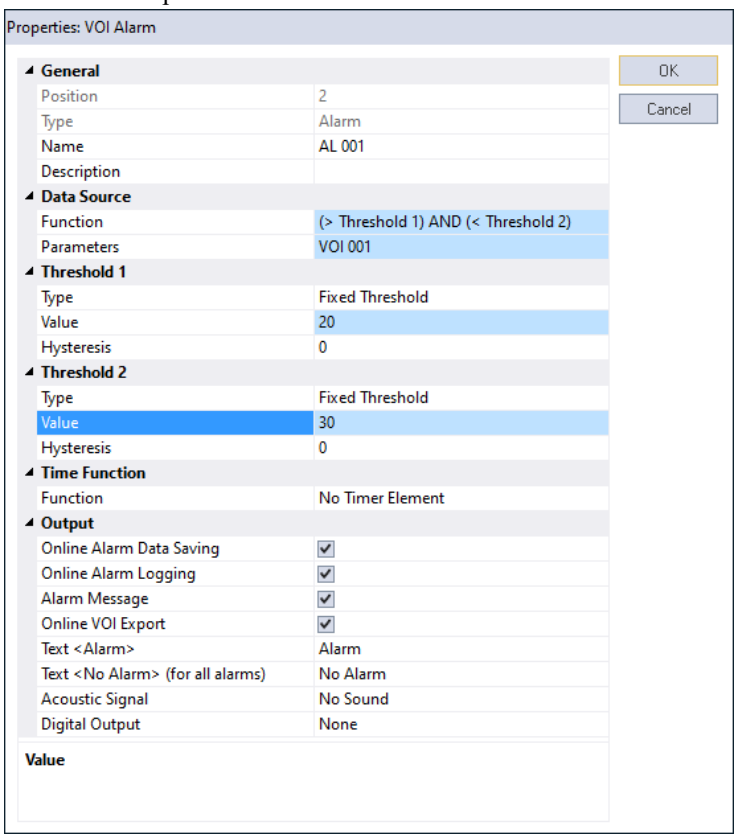
- (>Threshold)
- (>Threshold) AND (<Threshold 2)
- (<Threshold) OR (>Threshold 2)
- Digital input with one parameter



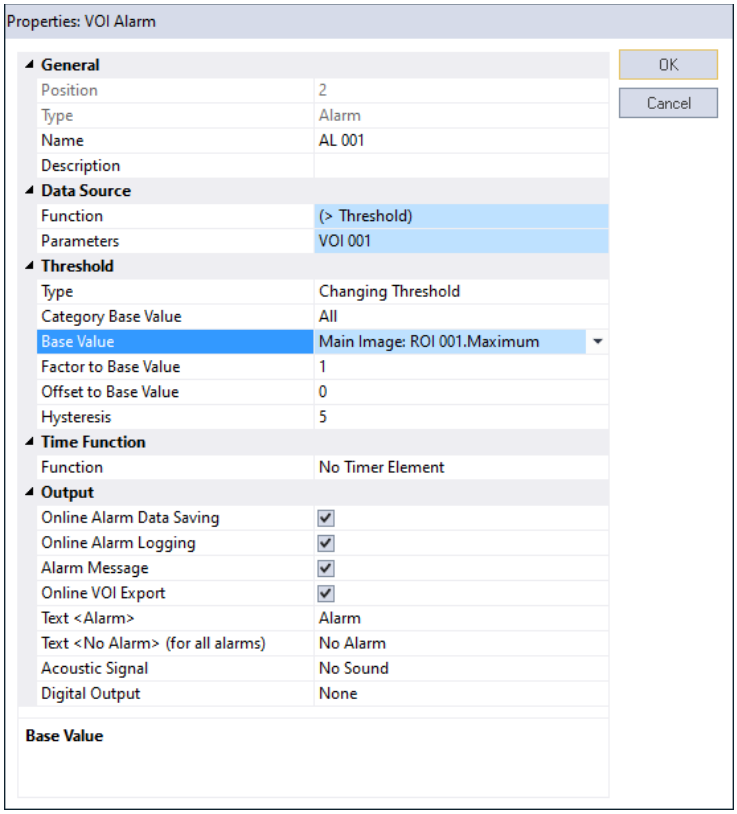
Data Source Parameters (for functions with a threshold):

One VOI value per threshold may serve as parameter for VOI alarm calculation. A threshold may be defined as fix or variable threshold.

- Example: fix thresholds with limit:



- Example: variable threshold in the case of limit violation:



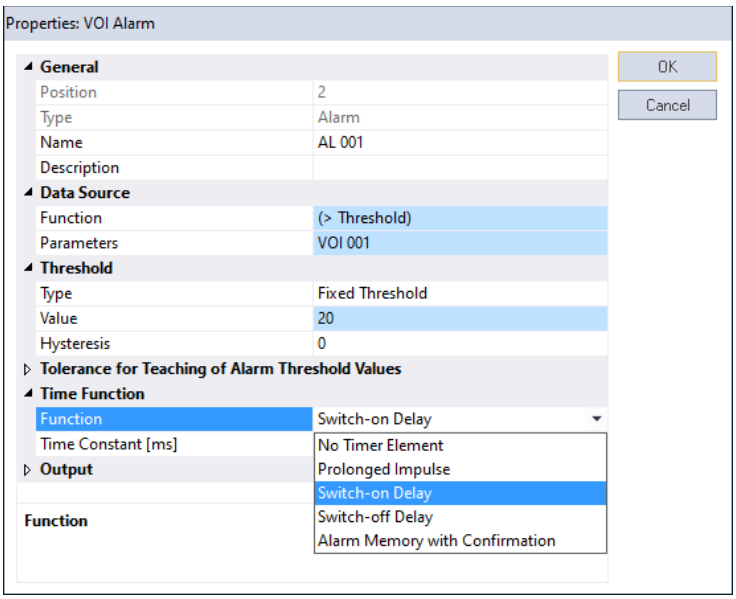
By changing the values "Factor to Base Value" and "Offset to Base Value" the threshold function may be defined as linear function.

By adding a hysteresis value a switching off delay can be defined.

Time functions for VOI Alarms

The following time functions are available for VOI Alarms:

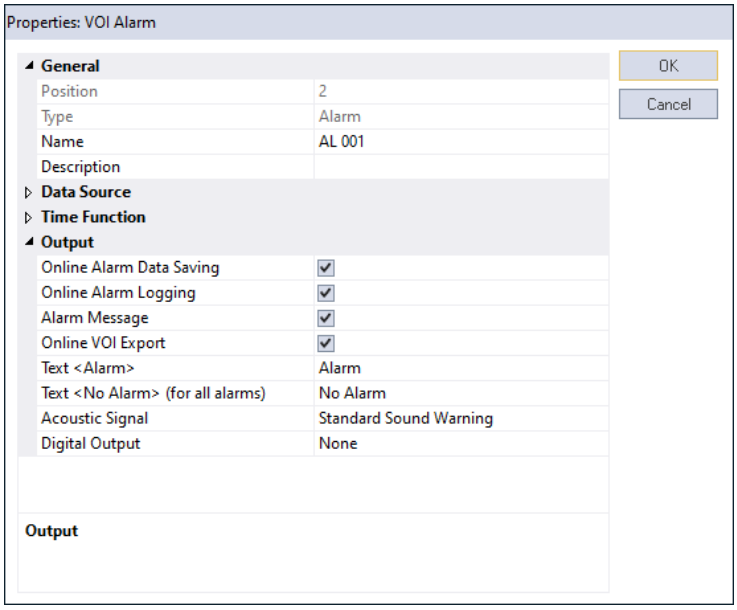
- Prolonged Impulse: After triggering, the alarm remains active for a constant time (defined time constant).
- Switch-on Delay: The alarm activation is delayed a certain time (defined time constant) after triggering.
- Switch-off Delay: The alarm remains active for a certain time (defined time constant) after the alarm condition has subsided.
- Alarm Memory with Confirmation: The alarm remains active until manually confirmed by the operator (see **Toolbar "VOI"** on page **106**).



Output of VOI Alarms

The following outputs of VOI alarms are possible:

- Online Alarm Data Saving (see **Online Alarm Data Saving** on page **27**)
- Alarm Messages (see **Alarm Messages** on page **62**) with customizable text for "Alarm" and "No Alarm"
- Output of an acoustic signal (default warning signal or playing an audio file)
- Online VOI Export into a text file (see **Online Alarm Data Saving** on page **27**)
- Output to a camera output channel (OUT0/OUT1)
- Output as digital value to an IO system



Teach-In for VOI Alarms

The Teach-In function for VOI alarms allows an automatic definition of fix thresholds for VOI alarms based on an analysis of the corresponding VOI values.

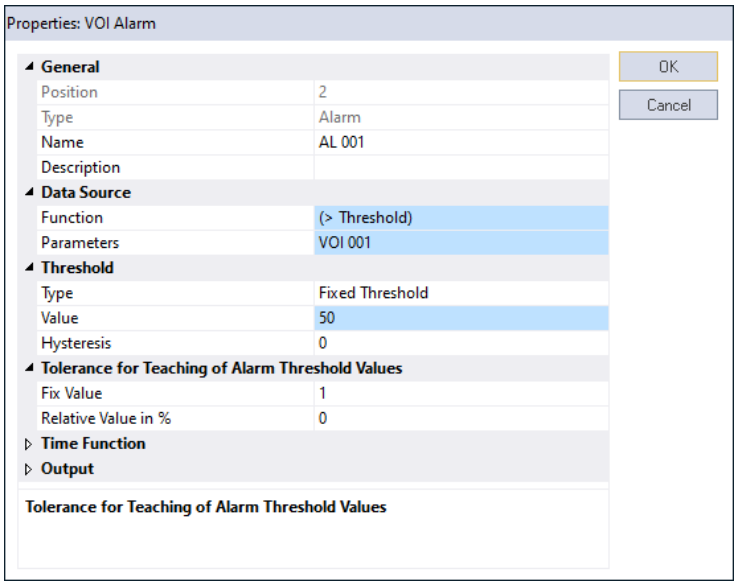
In the "Teach-In Stage" a min/max analysis of VOI values in done, i.e. for each VOI value the minimum and maximum values are recorded. The results are displayed in the **Property Pane "VOI Lists"** (see page **113**).

Afterwards, the alarm thresholds are derived from the recorded minima and maxima. For each VOI alarm, it is possible to set an individual tolerance range.

The Teach-In function is not applicable for the function "(> threshold 1) AND (< threshold 2)" and for the threshold type "variable threshold".

Toolbar "VOI: Teach-In" (see page 106) or menu **[VOI > Teach-In]** contains functions for teaching VOI alarms.

- Online min/max analysis during data acquisition:
  With menu item **[VOI > Teach-In > Min/Max On for Current Image]** or **Toolbar "VOI: Teach-In"** the min/max analysis can be switched on or off.
  With menu item **[VOI > Teach-In > Reset Min/Max]** or **Toolbar "VOI: Teach-In"** all previous min/max values are deleted.
- Offline min/max analysis for a sequence:
  Menu item **[VOI > Teach-In > Min/Max On for All Images]** or **Toolbar "VOI: Teach-In"** activates the min/max analysis for all images of a sequence.
  Menu item **[VOI > Teach-In > Min/Max Off for All Images]** or **Toolbar "VOI: Teach-In"** deactivates the min/max analysis for all images of a sequence.
  Menu item **[VOI > Teach-In > Min/Max On for Current Image]** or **Toolbar "VOI: Teach-In"** activates and deactivates the min/max analysis for the current image.
  Menu item **[VOI > Teach-In > Update Min/Max]** or **Toolbar "VOI: Teach-In"** starts the recalculation of the min/max values.
- Set thresholds after the min/max analysis:
  After a min/max analysis is done, the thresholds for all VOI alarms can be set with menu item **[VOI > Teach-In > Set Thresholds]** or **Toolbar "VOI: Teach-In"**. For each VOI alarm, it is possible to set a fix and/or variable tolerance range (see **Properties of VOI Alarms** on page **55**).



- Adjust thresholds after the min/max analysis:
  If required, the thresholds can be adjusted using new data. In this case, the new min/max analysis adds values to the existing thresholds.

VOI Alarm Combination

Insert a VOI Alarm Combination

Toolbar "VOI" (see page 106) or menu **[VOI]** creates a new VOI alarm combination, if at least one VOI alarm is available.

The dialog box for setting the properties of a VOI alarm combination is being opened (see page 60).

The property pane "VOI Lists" (see **Property Pane "VOI Lists"** on page **113**) shows a list of all VOI with their current values.

It is also possible to display a separate VOI list for only VOI alarm combinations.

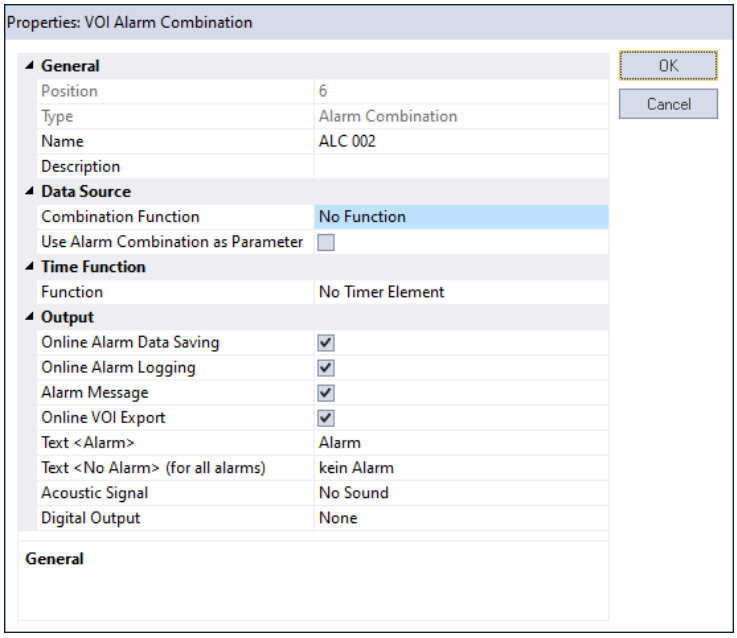
Duplicate an existing VOI alarm combination:

In **Property Pane "VOI Lists"** (see page **113**), a right click on the list row duplicates the VOI. Afterwards, the **Properties of VOI Alarm Combinations** may be changed (see page **60**).

Properties of VOI Alarm Combinations

The dialog box for setting the properties of a VOI alarm combination can be opened in the following ways:

- Menu item **[VOI > Properties]**
- **Toolbar "VOI"** (see page **106**)
- **Property Pane "VOI Lists"** (see page **113**): Double-click on the row of the desired VOI alarm combination



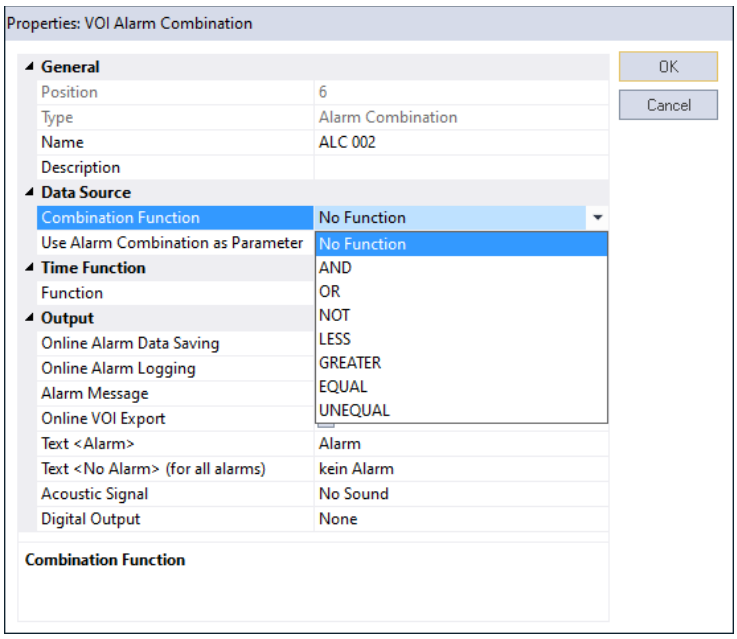
Data Source of VOI Alarm Combinations

The data source determines the calculation of the VOI alarm combinations.

Data Source – Combination Functions:

The following combination functions are supported:

- Logic "AND" of maximal 100 parameters
- Logic "OR" of maximal 100 parameters
- Logic "NOT" of one parameter
- LESS: The number of active alarms is less than the specified "Alarm Counter" value.
- GREATER: The number of active alarms is greater than the specified "Alarm Counter" value.
- EQUAL: The number of active alarms is equal to the specified "Alarm Counter" value.
- UNEQUAL: The number of active alarms is not equal to the specified "Alarm Counter" value.



Data Source - Parameter:

A VOI alarm can be selected as parameter for calculating a VOI alarm combination.

Data Source – Use alarm combination as parameter:

A calculated VOI alarm combination can also be used as parameter for other VOI alarm combinations as long as the option "Use Alarm Combination as Parameter" is activated. The associated VOI alarm combination is then displayed in the list of parameters for the data source of another VOI alarm combination.

It is not allowed to interlace the VOI alarm combinations "AND" and "OR" more than one time.

Output of VOI Alarm Combinations

The possibilities for the alarm output of a VOI alarm combination are the same as in VOI alarms (see **Output of VOI Alarms** on page **58**).

Alarm Interaction

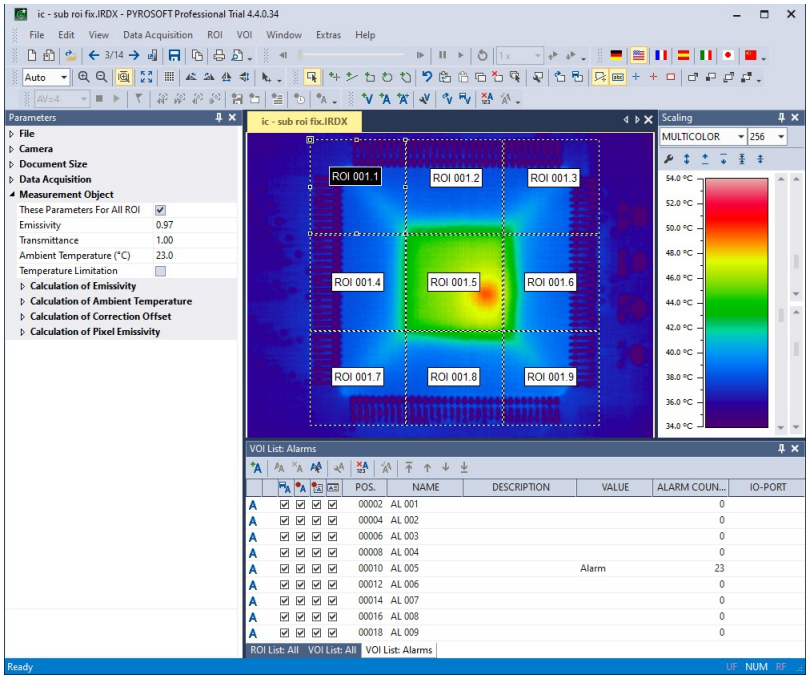
Show Alarms in Image Window

An alarm may be displayed by highlighting the triggering ROI in the image window.

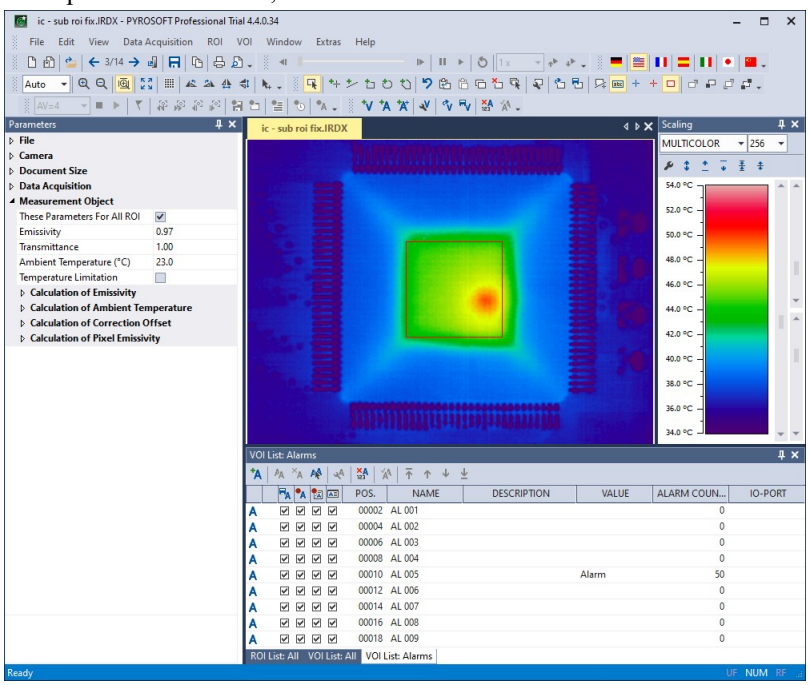
The display of a ROI alarm has to be activated in menu item **[ROI > Display > Show Alarms]** or **Toolbar "ROI"** (see page **105**), see **Show ROI in the Image Window** on page **45**.

The alarm display of the ROI in the image window can be configured individually for each ROI in the dialog box **Properties of ROI** (see page **43**):

Example: Show ROI and ROI Labels On, Show Minimum, Maximum and Alarm Off:



Example: Show ROI Off, Show ROI Alarm On:



Online Alarm Data Saving

Online alarm data saving allows an automatic data storage of VOI alarms and VOI alarm combinations during data acquisition (see **Online Alarm Data Saving** on page 27).

Alarm Messages

During online data acquisition, alarm messages pane allows shows occurring VOI alarms or VOI alarm combinations as a list.

Online alarm messages are displayed as text rows with starting time and duration in **Property Pane "VOI List: Online Alarm Messages"** (see page 115) and may be receipted.

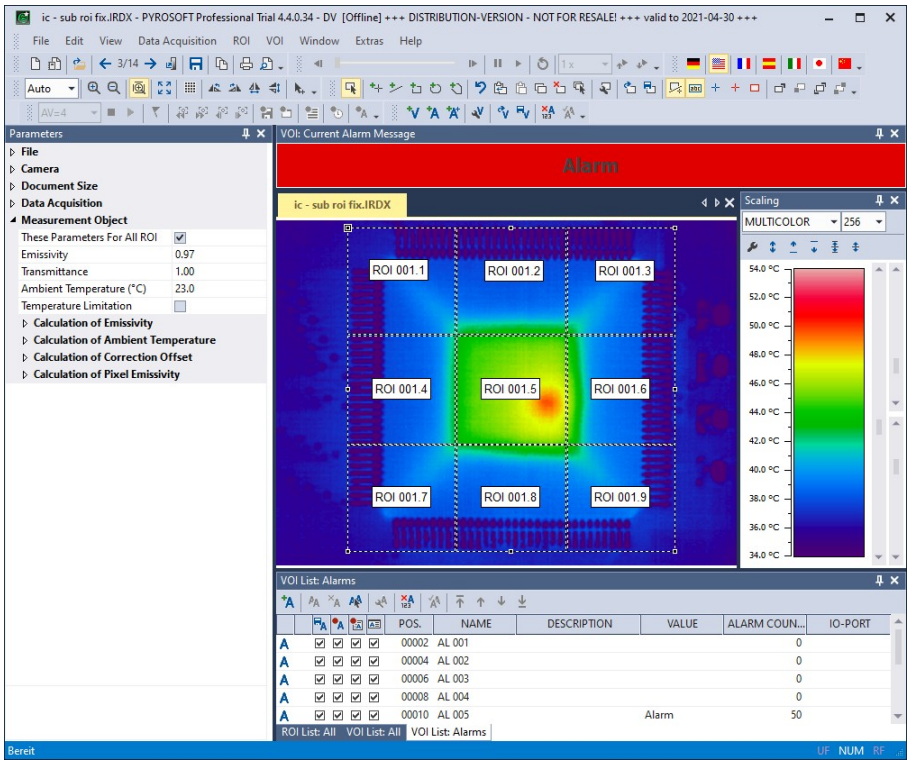
The alarm messages may be activated and deactivated for each VOI alarm or VOI alarm combination individually, see:

- **Properties of VOI Alarms** on page **55**
- **Properties of VOI Alarm Combinations** on page **60**
- **Property Pane "VOI Lists"** on page **113**

The default setting is "Off"; the alarm message has to be activated for each VOI alarm or VOI alarm combination explicitly.

Additionally, the current alarm message can be highlighted and displayed in **Property Pane "VOI: Current Alarm Message"** (see page **116**).

Example: Current Alarm Message



Acoustic Alarm Message

The output of an acoustic alarm signal can be set for each VOI alarm or VOI alarm combination with:

- **Properties of VOI Alarms** on page **55**
- **Properties of VOI Alarm Combinations** on page **60**

Alarm Counter

Each VOI alarm and each alarm of a VOI alarm combination is being counted during the recalculation of VOI and displayed in the VOI lists (see **Property Pane "VOI Lists"** on page **113**).

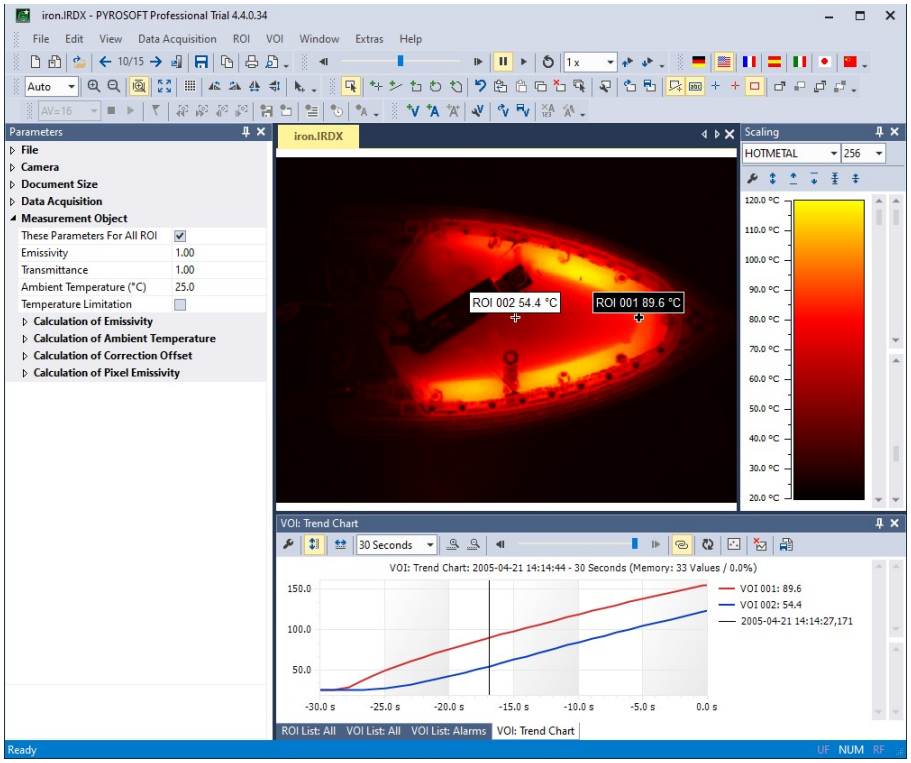
The **Property Pane "VOI Diagram: Alarm Counter"** (see page **116**) displays the alarm counters as a diagram (**[VIEW > VOI Windows > VOI Diagram: Alarm Counter]**.

With menu item **[VOI > Reset Alarm Counter]** or **Toolbar "VOI"** (see page **106**) all alarm counters can be deleted.

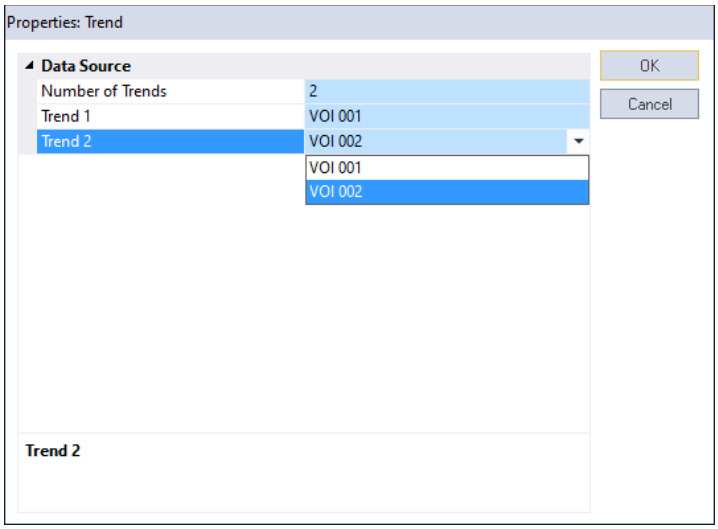
Trend Charts

The trend chart in **Property Pane "VOI: Trend Chart"** (see page **114**) is a temporal display of calculated VOI values (see **VOI – "Value of Interest"** on page **51**).

Example: Trend chart



Menu item **[VOI: Trend…]** or the local toolbar in the property pane displays the dialog box for selecting the number and source of the trend profile:

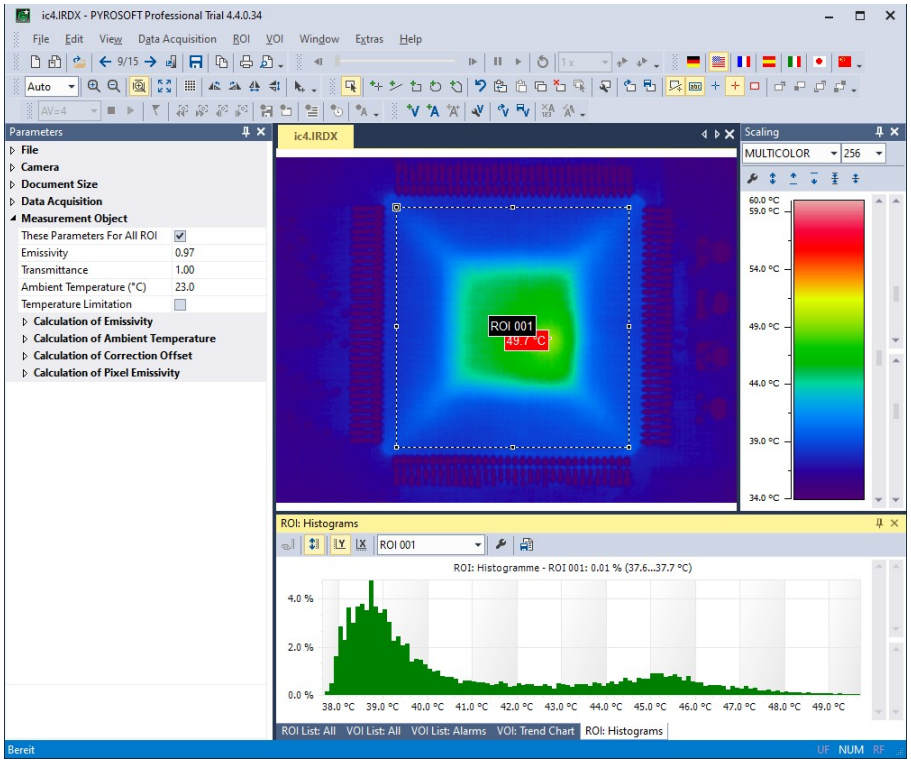


- Up to 10 trend profiles.
- The number of measurement points per trend profile is limited to 15.000.

Histograms

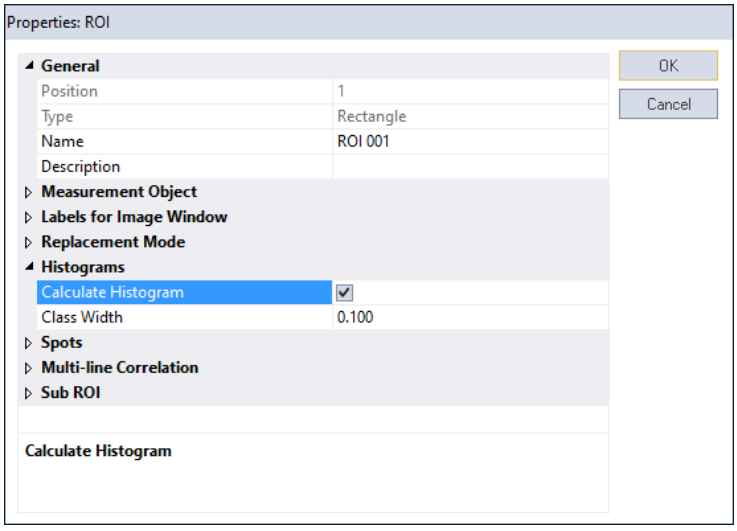
A histogram is the graphical representation of the frequency distribution of the measured temperature values inside a ROI line or a ROI area (rectangle, ellipse/circle or polygon).

Example: Histogram



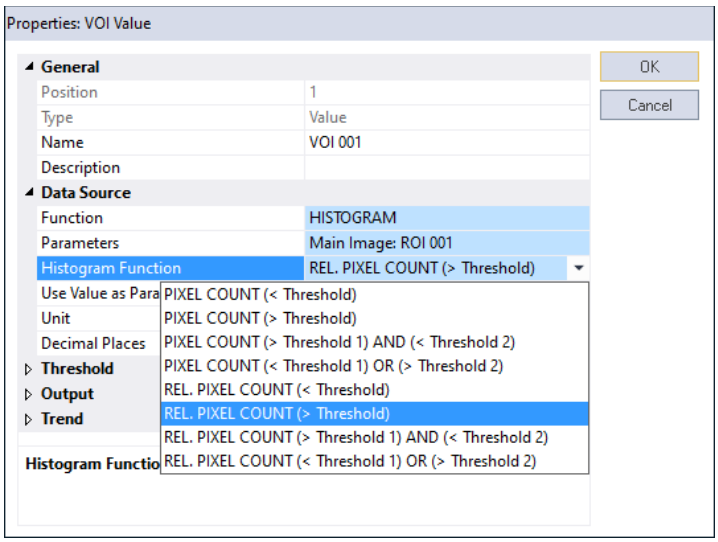
Property Pane "ROI: Histograms" (see page **112**) displays a selected histogram.

The calculation of a histogram for a ROI has to be activated explicitly (see **Properties of ROI** on page **43**).



If the option "Calculate Histogram" is activated, the class width can be selected. The displayed ROI may be chosen in **Property Pane "ROI: Histograms"** (see page **112**).

In connection with the VOI calculation (see **VOI – "Value of Interest"** on page **51**), VOI values with histogram functions can be created:



As an input to VOI calculation it is possible to apply absolute or relative numbers of pixel with one or two fix or variable thresholds.

The possibilities for the alarm output are the same as in VOI values (see **Output of VOI Values** on page **54**).

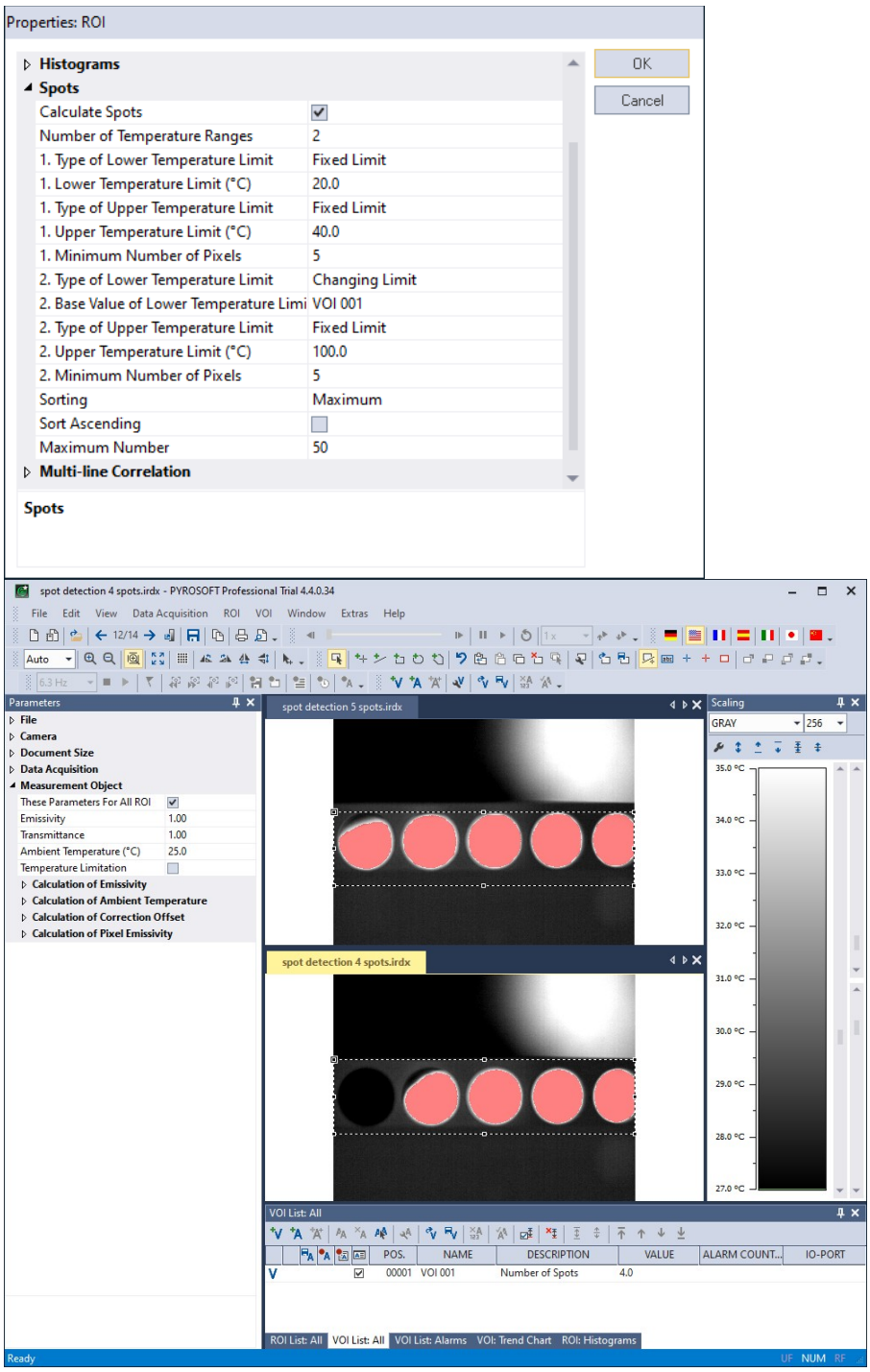
For example in connection with a VOI alarm (see **VOI Alarm** on page **55**), it is possible to generate an alarm, if a certain absolute or relative number of pixel in the ROI lies above a threshold.

Spots

A spot is a local connected area which is separated from the surrounding by a temperature range.

Example: Spot Calculation

The spot detection (line, rectangle, circle/ellipse, polygon) has to be activated explicitly for the desired ROI (see **Properties of ROI** on page **43**).



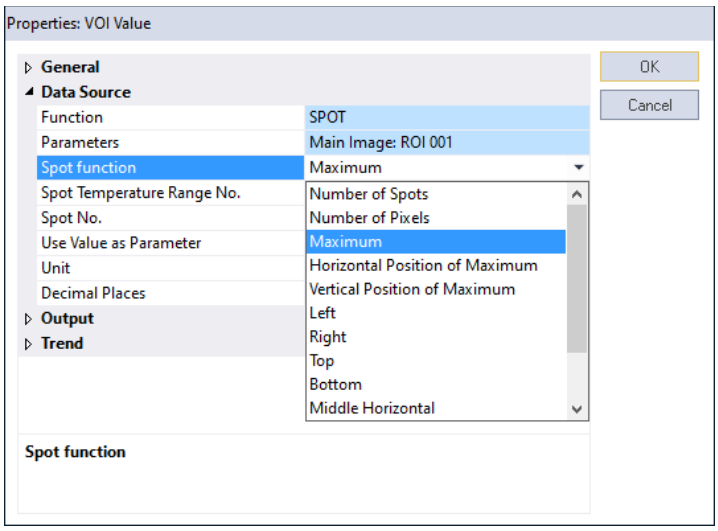
If the option "Calculate Spots" is activated, the parameters for calculation and sorting can be selected. For each ROI, up to 4 temperature ranges can be taken into account for the spot calculation. For each temperature range the temperature limits and the minimum number of pixels have to be specified.

The spot colors can be selected in menu **[EXTRAS > Options]** (see **Program Settings** on page **95**).

Result of calculation:

The number of spots found is displayed in the column "Number of Spots" in property pane "ROI-List: All" (see **Property Pane "ROI Lists"** on page **111**).

In VOI calculation (see **VOI – "Value of Interest"** on page **51**), VOI values can be created using spot functions:



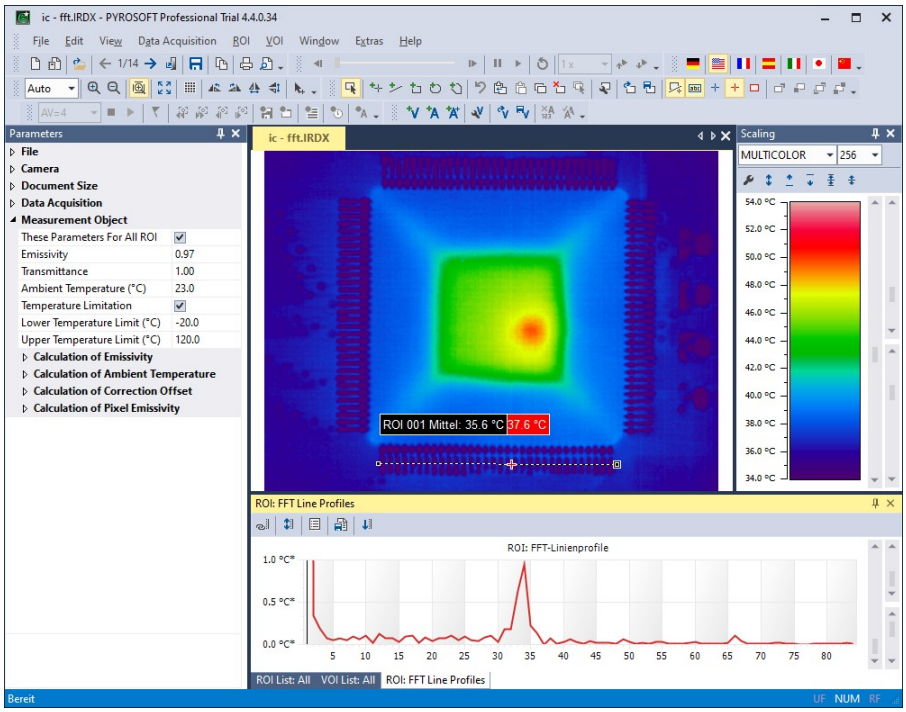
The number of spots, number of pixels and other calculation results can be used.

For example, using a VOI alarm (see **VOI Alarm** on page **55**), it is possible to generate an alarm if a certain number of spots have not been detected in an ROI.

FFT

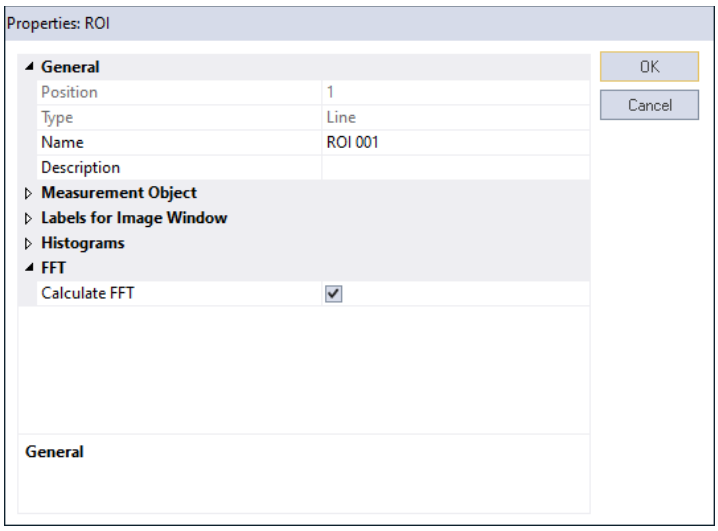
A FFT ("Fast Fourier Tranform") algorithm computes the discrete Fourier transform converting the temperature distribution across a ROI line to a representation in the frequency domain.

Example: FFT

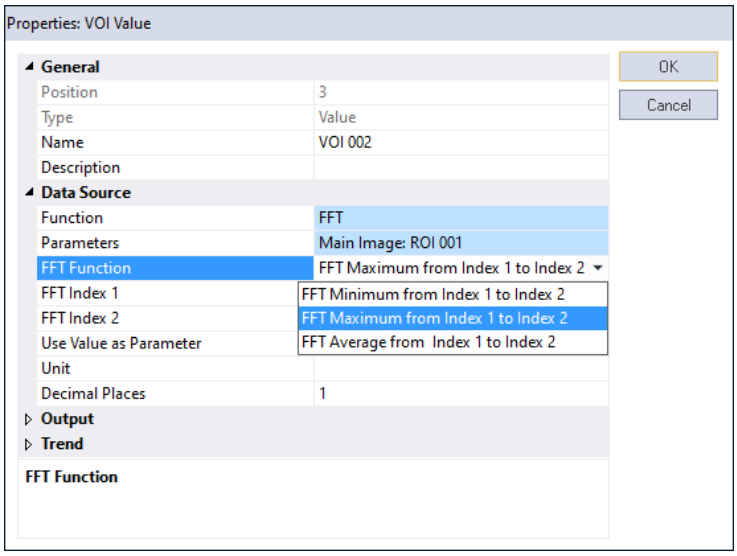


Property Pane "ROI: FFT Line Profiles" (see page **112**) displays the FFT chart.

The calculation of a FFT for a ROI line has to be activated explicitly (see **Properties of ROI** on page **43**).



In connection with the VOI calculation (see **VOI – "Value of Interest"** on page **51**), VOI values with FFT functions can be created:



As an input to VOI calculation it is possible to apply a maximum, minimum or mean value within a defined segment of the FFT chart.

The possibilities for the alarm output are the same as in VOI values (see **Output of VOI Values** on page **54**).

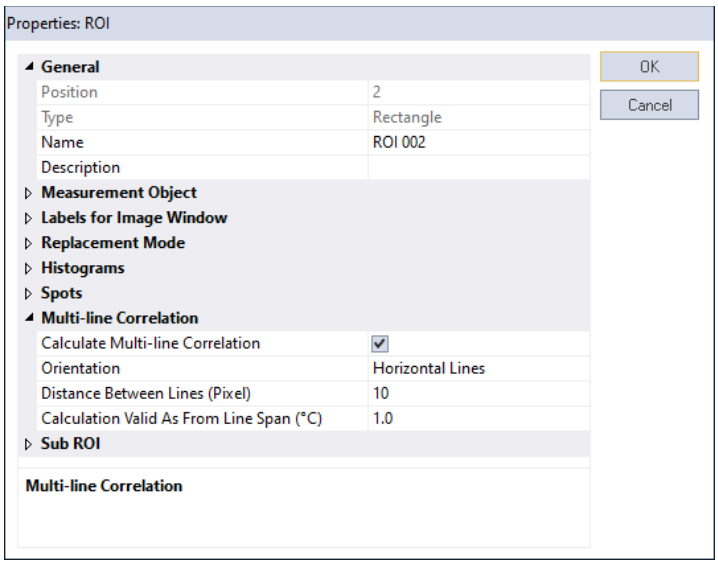
For example in connection with a VOI alarm (see **VOI Alarm** on page **55**), it is possible to generate an alarm, if the calculated maximum of the FFT at a defined frequency lies below a threshold.

Multi-line Correlation

The multi-line correlation analyzes the correlation distribution across a rectangle ROI. For that, lines are placed across the rectangle. Then, the lines which have a certain distance are paired. For every pair of lines the coefficient of correlation is calculated. The maximum value of correlation is "1.0" (the line profiles are identical), the minimum value is "-1.0" (the line profiles are opposite). The pair of lines with the lowest correlation value is displayed in the ROI.

By evaluating the correlation values, a statement can be made about the uniformity of the temperature distribution within the ROI.

The calculation of multi line correlation has to be activated explicitly for the desired rectangle ROI (see **Properties of ROI** on page **43**).



Define the following parameters in the ROI properties dialog:

Orientation:

Choose between horizontal or vertical lines.

Distance between lines:

Define the pixel distance between the lines that are to be used for the calculation.

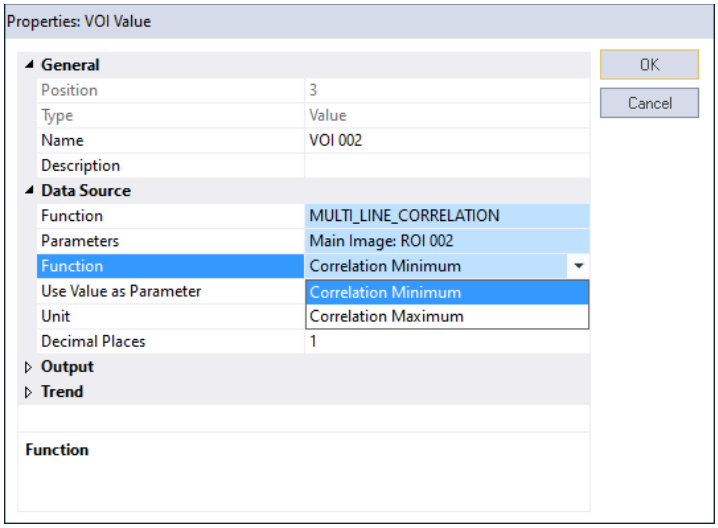
Calculation valid as from line span:

The line span is defined as the difference between temperature maximum and temperature minimum value of a line. If it is less than the required minimum, the affected line is excluded from the calculation (instead, the default value "1.0" is used as correlation result for this line). If the minimum line span is defined as "0.0", all lines are used.

Result of calculation:

The result of the multi-line correlation is displayed in the columns "Correlation Minimum" and "Correlation Maximum" in property pane "ROI-List: All" (see **Property Pane "ROI Lists"** on page **111**).

In connection with the VOI calculation (see **VOI – "Value of Interest"** on page **51**), the results of the multi line correlation can be used as a VOI value:



As an input to VOI calculation it is possible to apply the correlation maximum or minimum value.

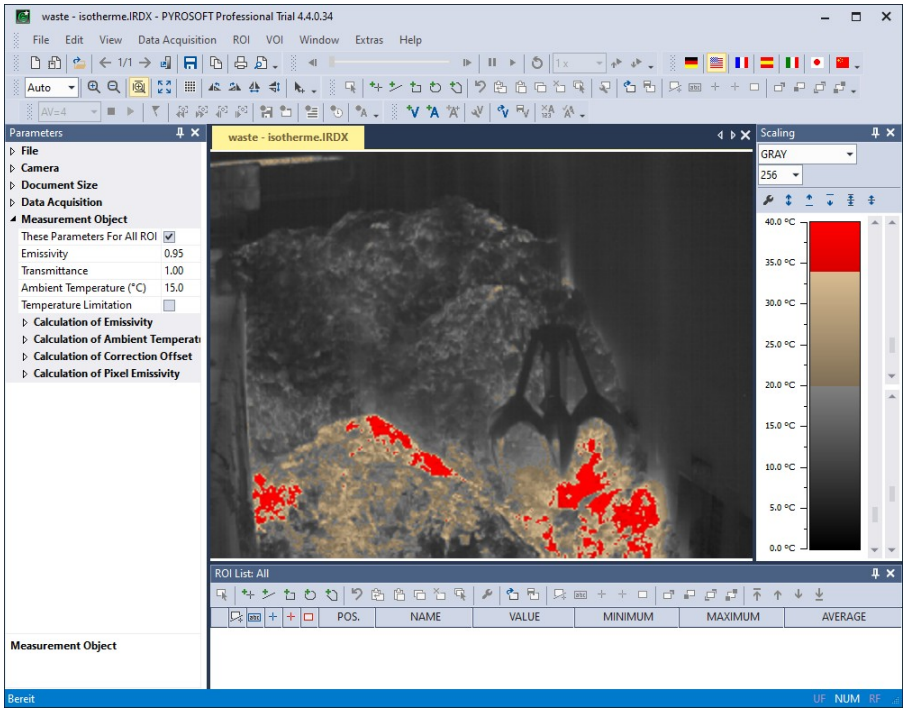
The possibilities for the alarm output are the same as in VOI values (see **Output of VOI Values** on page **54**).

For example in connection with a VOI alarm (see **VOI Alarm** on page **55**), it is possible to generate an alarm, if the calculated minimum of the multi line correlation lies below a certain threshold.

Isotherms

An isotherm is the colored highlighting of a certain temperature range in the image window.

Example: Isotherm



In **Property Pane "Isotherms"** (see page **110**), up to five isotherms can be defined for the image window. It is possible to assign a different color and saturation to each isotherm.

The **Property Pane "Isotherms"** is not contained in the default layout, it can be opened with menu item **[VIEW > Isotherms]**.

For a clear representation of the isotherms, the color bar "GRAY" (see **Property Pane "Scaling"** on page **109**) is recommended.

Reference Image

It is possible to attach a reference image to a measurement document. First, to compare the measurement image to a reference. Second, to serve as base for calculated values or parameters in connection with a ROI or VOI analysis.

Menu item **[WINDOW > Reference Image > New]** opens the reference image display, loading the current image as reference image.

With menu **[WINDOW],** it is possible to:

- Load a reference image from a file
- Load a reference image from the current main image
- Display a copy of the reference image in an additional property pane
- Save or close a reference image

In connection with an IO system, it is possible to trigger the reference image from the current main image externally (see **Reference and Difference Image Trigger** on page **25**).

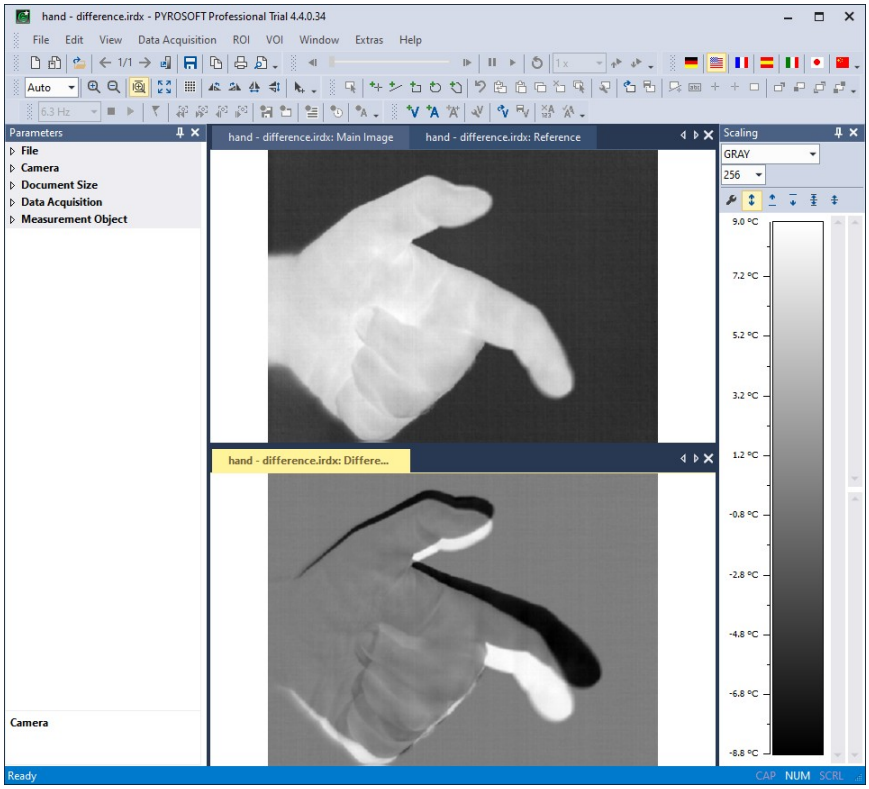
For the reference image customized ROI may be defined (see **ROI – "Region of Interest"** on page **40**).

Defining VOI parameters (see **VOI – "Value of Interest"** on page **51**), the different ROI sources of main image and reference image are labeled.

Difference Image

It is possible to calculate a difference image based on a reference image in a measurement document, which serves as base for calculated values or parameters in connection with a ROI or VOI analysis.

Example: Difference image



Menu item **[WINDOW > Difference Image > New]** opens the difference image display. If a reference image is not open yet (see **Reference Image** on page **71**), it is created automatically.

The current difference image is being calculated pixel-by-pixel, main image "minus" reference image. If a reference image is not open yet, the current image is applied as reference image and the entire difference image has the value "0".

With menu **[WINDOW],** it is possible to:

- Update the difference image
- Display a copy of the difference image in an additional property pane
- Save or close the difference image

In connection with an IO system, it is possible to trigger the reference image from the current main image and the calculation of the difference image externally (see **Reference and Difference Image Trigger** on page **25**).

It is possible to define customized ROI for the reference image and the difference image (see **ROI – "Region of Interest"** on page **40**).

Defining VOI parameters (see **VOI – "Value of Interest"** on page **51**), the different ROI sources of main image, reference image and difference image are labeled.

Filter Image

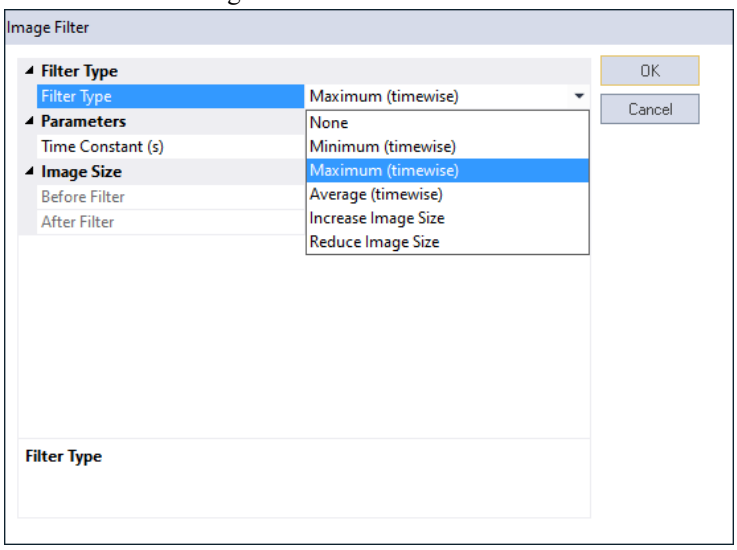
It is possible to attach a filter image to a measurement document in order to change the image size or filter the image data using a user-defined time constant.

Menu item **[WINDOW > Filter Image > New]** opens the dialogue box "Image Filter" to define the necessary parameters.

Filter type:

The following filter types are available:

- Minimum (timewise)
- Maximum (timewise)
- Average (timewise)
- Increase image size
- Reduce image size



Time constant:

This option is only available if the minimum, maximum or average filter is selected. The specified time constant defines the time span used for calculation.

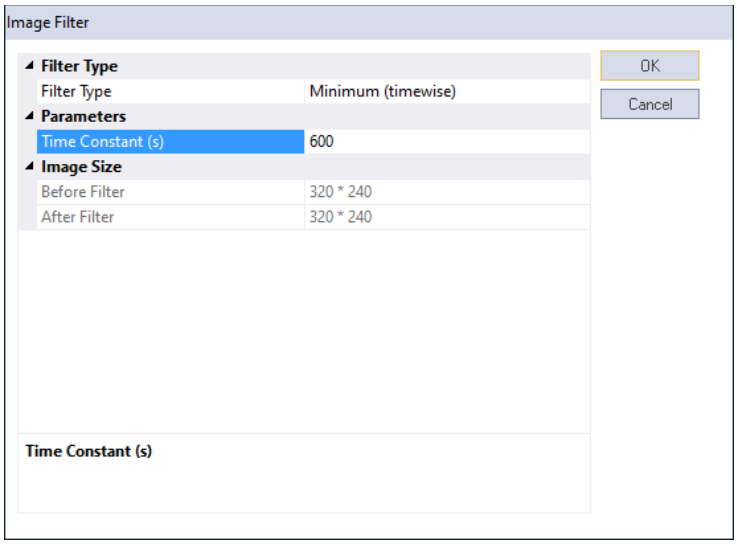
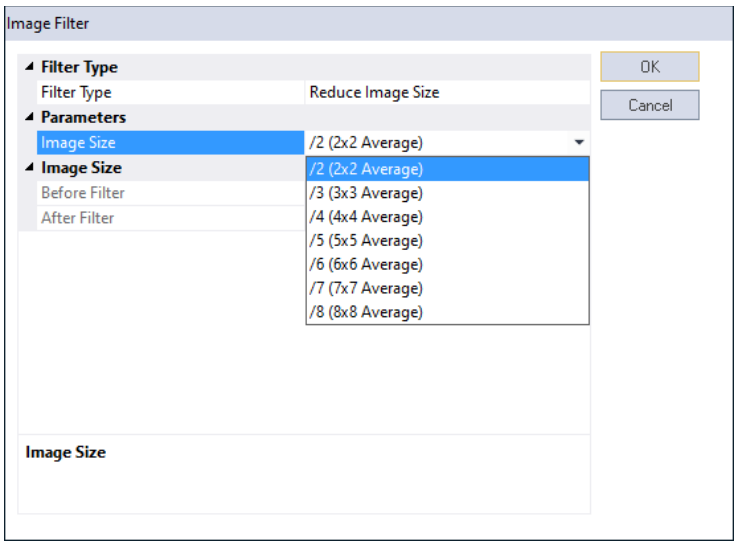


Image size:

This option is only available if the image size is changed. It defines the proportions of the new filter image.



With menu **[WINDOW],** it is possible to:

- Change the filter image parameters
- Update the filter image (offline)
- Display a copy of the filter image in an additional property pane
- Save or close the filter image

For the filter image customized ROI may be defined (see **ROI – "Region of Interest"** on page **40**).

When defining VOI parameters (see **VOI – "Value of Interest"** on page **51**), the ROI source of the filter image is labeled accordingly.

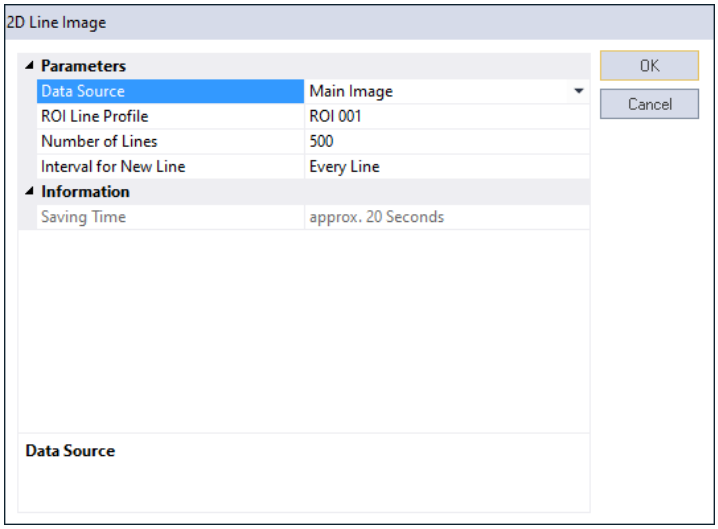
2D Line Image

It is possible to attach a 2D Line Image to a measurement document. The 2D Line Image is always related to a ROI line and shows its temperature distribution continuously.

Menu item **[WINDOW > 2D Line Image > New...]** opens the dialogue box "2D Line Image" to define the necessary parameters.

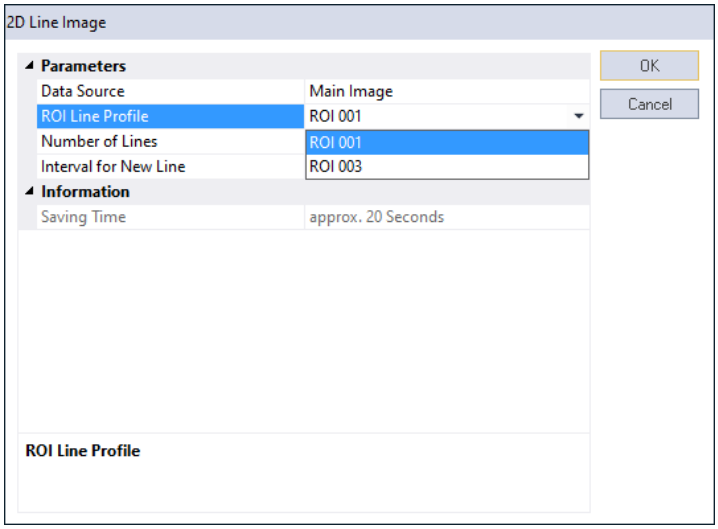
Data Source:

Defines the roi data source for the 2D Line Image.



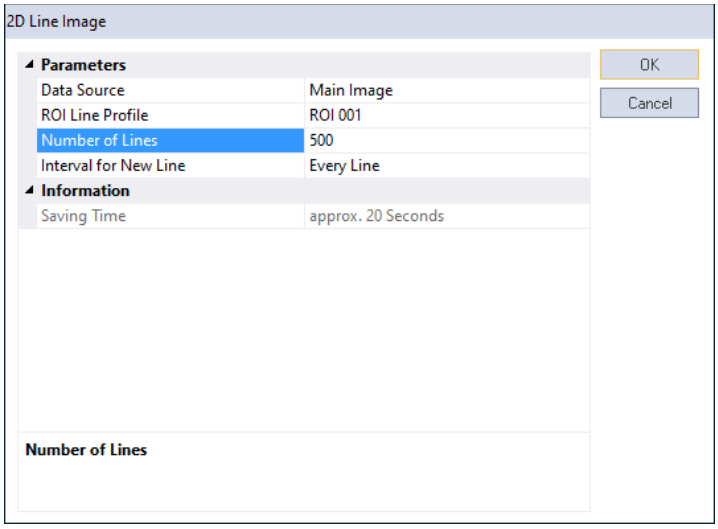
ROI Line Profile:

Specifies the ROI line to be displayed in the 2D Line Image.



Number of Lines:

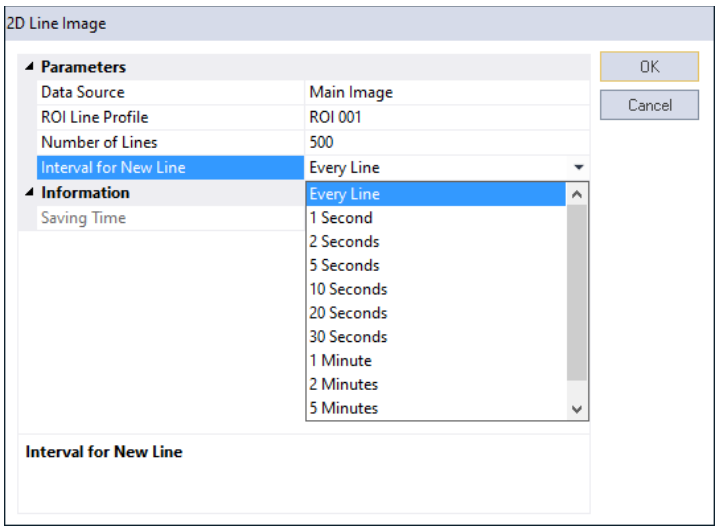
Specifies the desired length (in lines) of the scrolling image. It depends on the time span you want to display.



Interval for New Line:

The following options are available:

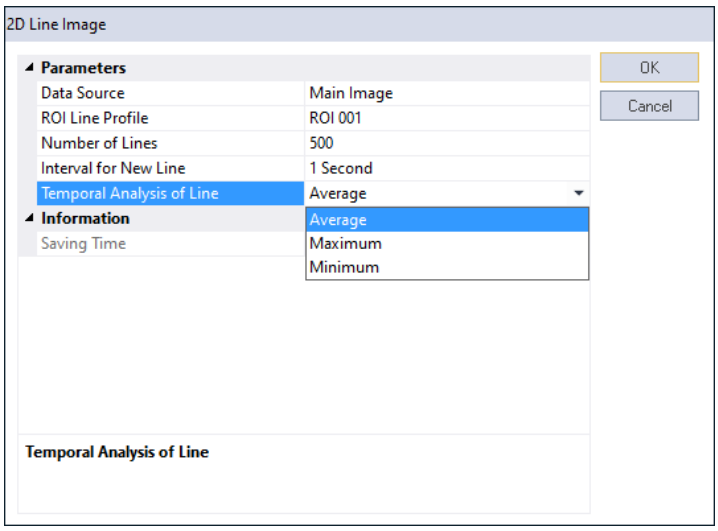
- Every line
- 1, 2, 5, 10, 20 or 30 seconds
- 1, 2, 5 or 10 minutes



Temporal Analysis of Line:

This option is not available if "Every Line" has been chosen as image interval. The following options are available:

- Average
- Maximum
- Minimum



With menu **[WINDOW],** it is possible to:

- Change the 2D Line Image parameters
- Update the 2D Line Image (offline)
- Display a copy of the 2D Line Image in an additional property pane
- Save or close the 2D Line Image

For the 2D Line Image customized ROI may be defined (see **ROI – "Region of Interest"** on page **40**).

When defining VOI parameters (see **VOI – "Value of Interest"** on page **51**), the ROI source of the 2D Line Image is labeled accordingly.

History

It is possible to add a History Image to a measurement document. It shows past alarm images or process images.

Provided the data recording has been stopped, menu item **[WINDOW > History > New...]** opens the dialogue box "History" to define the necessary parameters.

Data Source:

Defines the data source for the History Image.

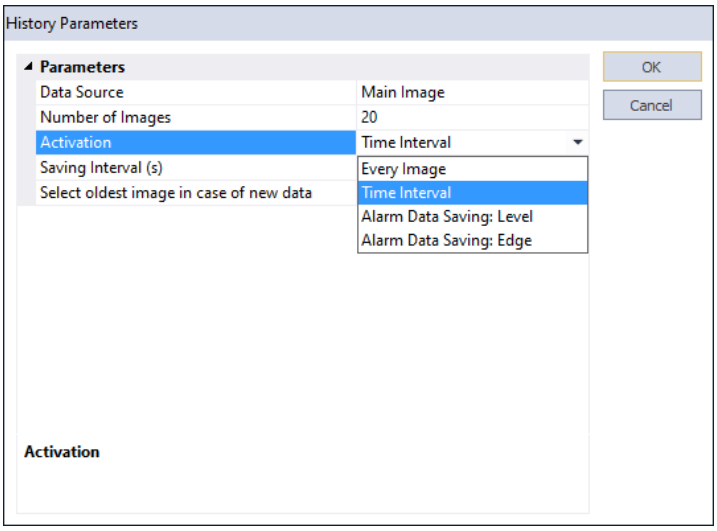
Number of Images:

Specifies the maximum number of images in the history memory.

Activation:

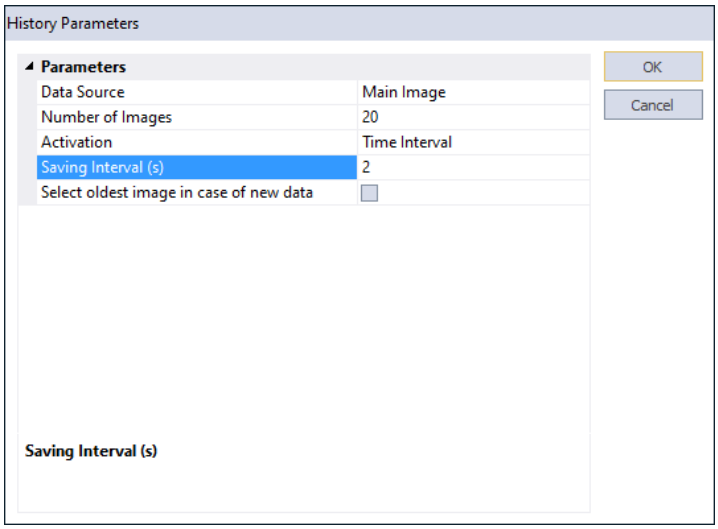
The following options are available:

- Every Image (for process images)
- Time Interval (for process images)
- Alarm Data Saving: Level (for alarm images)
- Alarm Data Saving: Edge (for alarm images)



Saving Interval (s):

This option is not available if "Alarm Data Saving" has been chosen. Specifies the time interval at which the process images are to be added to the history images.



Select oldest image in case of new data:

Shows the oldest image in the history image window during data aquisition.

Deactivate this option if you want to see the most recent image in the image window during data aquisition.

When data acquisition is stopped use the **Toolbar "Data Player"** (see page **103**) to navigate through the images in the history memory. Alternatively, the **Property Pane "History Player"** (see page **110**) can be used for this purpose.

With menu **[WINDOW > History],** it is possible to:

- Change the History parameters
- Display a copy of the History in an additional property pane
- Open **Property Pane "History Player"** (see page **110**)
- Remove the oldest or all images from the History
- Close the History

Projection Image

In the projection image, the content of a polygon ROI is projected onto a straight surface.

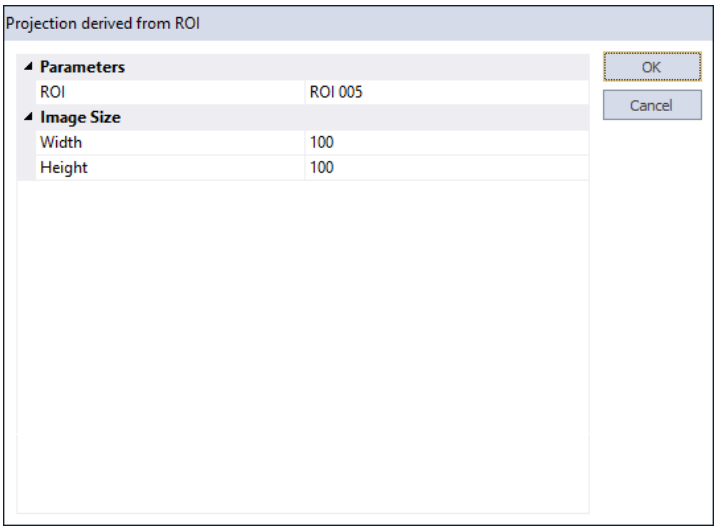
Provided the data recording has been stopped, menu item **[WINDOW > Projection Image > New...]** opens a dialogue box to define the necessary parameters. Prerequisite is an existing polygon ROI with 4 or 6 corners.

ROI (Data Source):

Chooses a polygon ROI as the source of the image data for the projection image.

Image Size:

The desired size of the projection image in pixels.



With menu **[WINDOW > Projection Image],** it is possible to:

- Change the Projection Image parameters
- Display a copy of the Projection Image in an additional property pane
- Save the Projection Image
- Close the Projection Image

For the Projection Image customized ROI may be defined (see **ROI – "Region of Interest"** on page **40**).

When defining VOI parameters (see **VOI – "Value of Interest"** on page **51**), the ROI source of the Projection Image is labelled accordingly.

Trigger Image

The trigger image allows snapshots to be triggered via a VOI alarm (see **VOI Alarm** on page **55)**

Please note: For the triggering VOI alarm, the option **[Output > Trigger for Trigger Image when Alarm]** must be activated in the "Properties: VOI Alarm" dialogue (see **Properties of VOI Alarms** on page **55**).

Provided the data recording has been stopped, menu item **[WINDOW > Trigger Image > New...]** opens a dialogue box to define the necessary parameters.

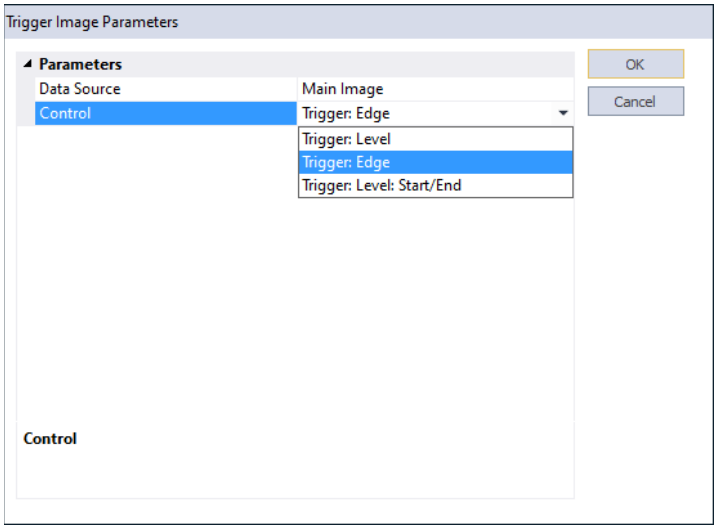
Data Source:

Defines the image data source for the Trigger Image.

Control:

The following options are available:

- Trigger: Level
- Trigger: Edge
- Trigger: Level: Start/End (Shows images for the beginning and the end of the alarm)



With menu **[WINDOW > Trigger Image],** it is possible to:

- Change the Trigger Image parameters
- Display a copy of the Trigger Image in an additional property pane
- Save the Trigger Image
- Close the Trigger Image

For the Trigger Image customized ROI may be defined (see **ROI – "Region of Interest"** on page **40**).

When defining VOI parameters (see **VOI – "Value of Interest"** on page **51**), the ROI source of the Trigger Image is labelled accordingly.

CHAPTER 8

Data Export

PYROSOFT Professional features various possibilities to export data.

In this Chapter

Print

The active image window can be printed by using menu item **[File > Print ...]** or **Toolbar "Standard"** (see page **103**).

In **Full Screen View** (see page **33**) it is possible to print directly with "Print" key.

Arrangement of margins, company logos, titles, scales and subtitles on the printed page can be configured in the program settings (see **View for Full Screen, Copy, Printing, Export** on page **96**).

Bitmap Export

Bitmap Export to Clipboard

The active image window can be copied to the clipboard by using menu item **[EDIT > Copy]** or **Toolbar "Standard"** (see page **103**).

The image format and arrangement of margins, company logos, titles, scales and subtitles in the exported view can be configured in the program settings (see **View for Full Screen, Copy, Printing, Export** on page **96**).

Bitmap Export to File

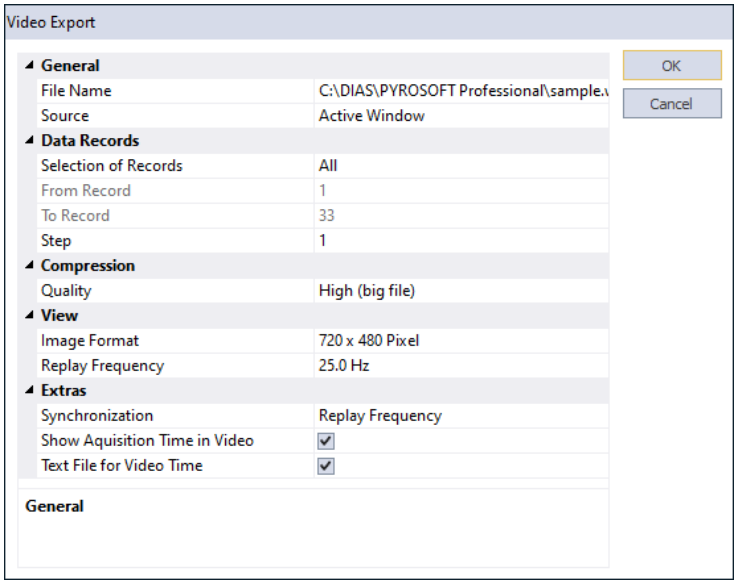
The active image window can be exported into an image file (BMP, GIF, JPG, PNG, TIFF) by using menu item **[FILE > Export > Bitmap Export...]**.

The image format and arrangement of margins, company logos, titles, scales and subtitles in the exported view can be configured in the program settings (see **View for Full Screen, Copy, Printing, Export** on page **96**).

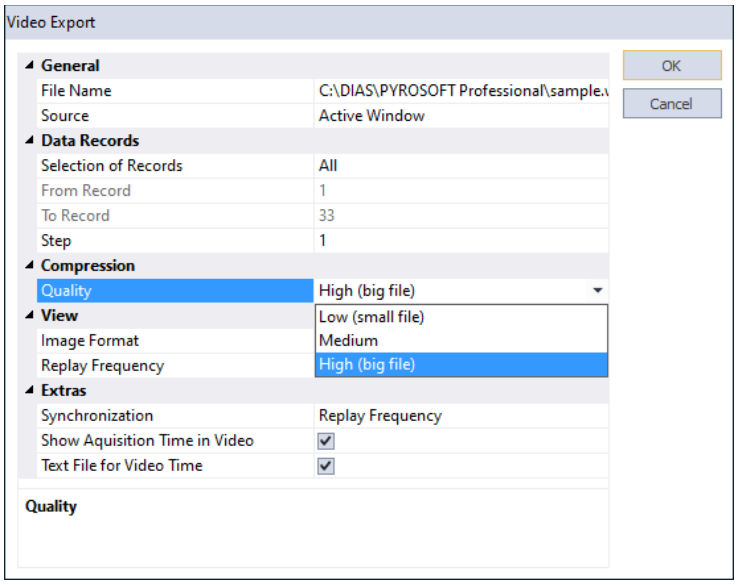
Video Export

For a recorded IRDX sequence, the active image window or the entire program desktop can be exported to a video file via the menu item **[FILE > Export > Video Export...]**.

Arrangement of margins, company logos, titles, scales and subtitles in the exported view can be configured in the program settings (see **View for Full Screen, Copy, Printing, Export** on page **96**).



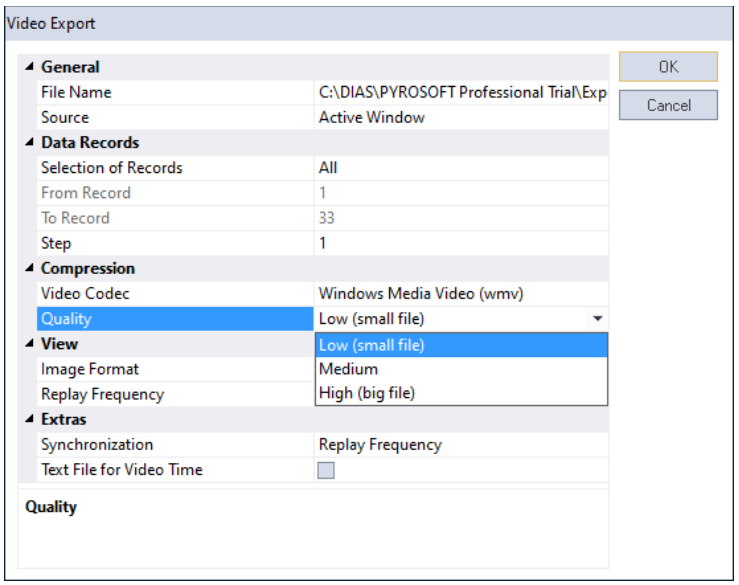
It is possible to export as Windows Media Video file (*.wmv) or as H.264 video file (*.mp4). You can choose one of 3 levels of quality.



If required, the acquisition time can be added to the video. It is then displayed at the bottom of the image.

If the "Text File for Video Time" option is activated, a text file is also generated that shows the mapping of frame number to video time.

Text Export



Text Export: Image

The active image window data can be exported into a text file with menu item **[FILE > Export > Text Export Image…]**.

For exporting a sequence the following options exist:

- Export current image
- Export all images
- Export a range of images

Text Export: VOI

The active VOI list can be exported into a text file by using menu item **[FILE > Export > Text Export VOI…]**.

For exporting a sequence the following options exist:

- Export the VOI of the current image
- Export the VOI of all images
- Export the VOI of a range of images

Text Export: ROI Line Profiles

The active ROI line profiles can be exported into a text file by using the toolbar in **Property Pane "ROI: Line Profiles"** (see page **111**).

Only the line profiles of the current data record of an open sequence are exported.

Text Export: ROI FFT Line Profiles

The active ROI FFT line profiles can be exported into a text file by using the toolbar in **Property Pane "ROI: FFT Line Profiles"** (see page **112**).

Only the line profiles of the current data record of an open sequence are exported.

Text Export: VOI- Trend Charts

The active VOI trend profiles can be exported into a text file by using the toolbar in **Property Pane "VOI: Trend Chart"** (see page **114**).

Online Export

Online Bitmap Export

Online bitmap export allows the automatic export of the active main image windows into an image file (BMP, GIF, JPG, PNG, TIFF) during data acquisition.

Further information may be found in **Online Bitmap Export** (see page **29**).

Online VOI Export

Online VOI export allows the automatic export of VOI values, VOI alarms and VOI alarm combinations into text files during data acquisition.

Further information may be found in (see **Online Alarm Data Saving** on page **27**).

CHAPTER 9

File Handling

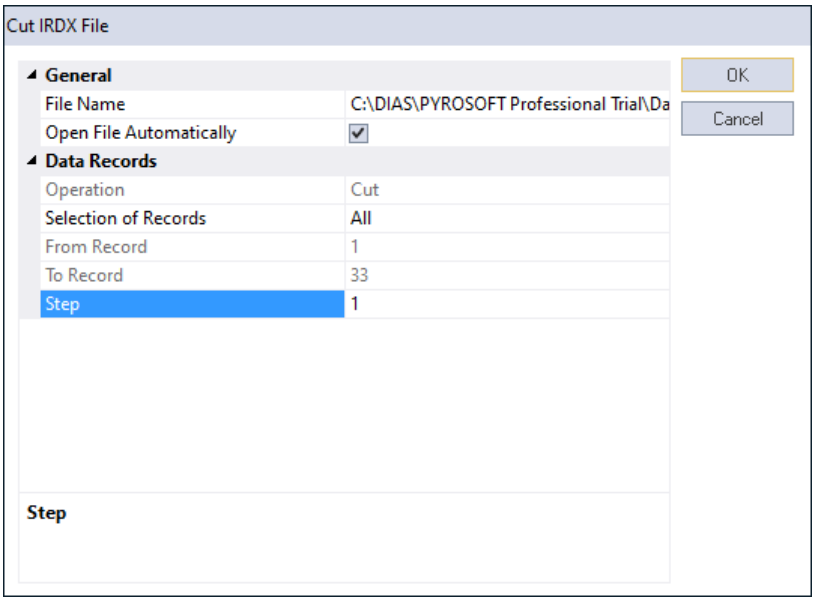
In this Chapter

Cutting Sequences

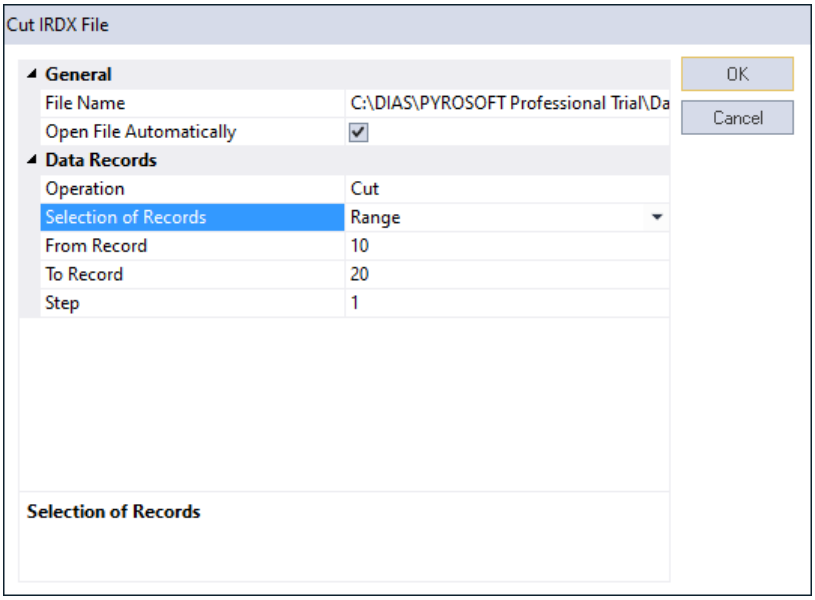
An open sequence can be cut and/or thinned out with menu item **[FILE > Cutting…]**. The following options are available:

- Cut with steps (Thin out): Reduce the length of a sequence by removing images at regular intervals (steps).

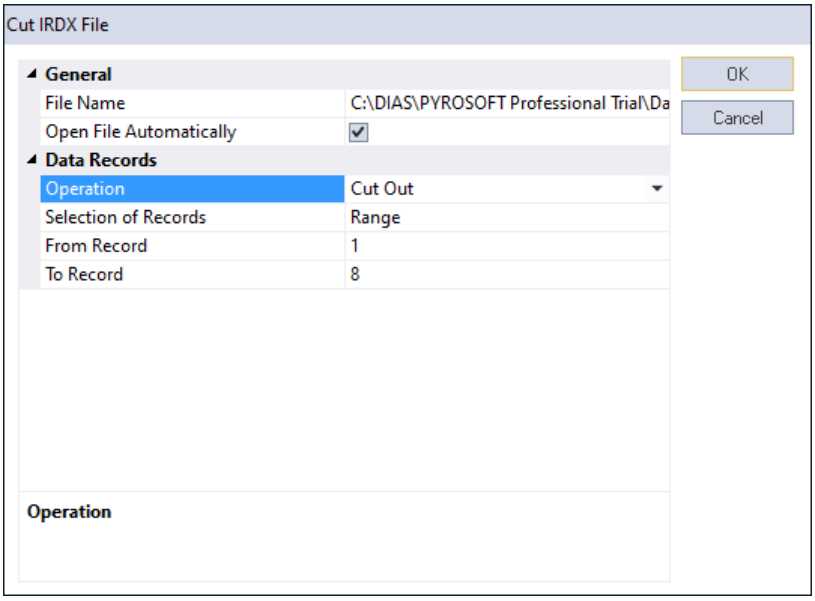
  Thus a step of 2 would mean every second image will be removed from the sequence.



- Cut a range: The specified images (records) will be saved to a new file.

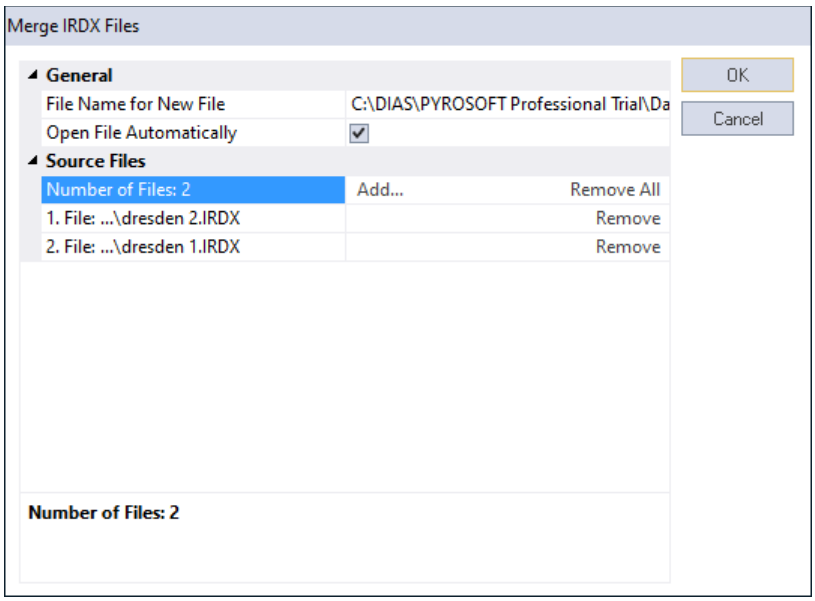


- Cut out: Removes the specified images (records) and saves the remaining images to a new file.



Merge Files

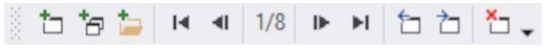
Make a single sequence out of multiple files (sequences and/or single images) using menu item **[FILE > Merge…]**.



The files are required to have matching camera serial numbers, image formats and measurement ranges!

Album

The **Toolbar "Album"** (see page **104**) contains helpful buttons for working with album files.



Album Files

An album file (*.irda) is a collection of IR data records coming from various sources:

- DIAS IRDX files (*.irdx)
- MobIR M8/TP8 image files (*.jpg)
- MobIR M8 video files (*.irv)
- Online measurement documents

One album may contain IR images from varying source files and file formats. Therefore enabling individual documentation, management and presentation of IR data, e.g.:

- Collecting single images, arranged in specific order.
- Cutting out individual images from IR sequences or videos.
- Saving IR images of varying sizes in one file.
- Color bar and scaling properties, ROI and VOI settings, etc. are saved individually for every data record.
- Creating a multi report from an album file.
- etc.

Working with Album Files

Creating a new Album

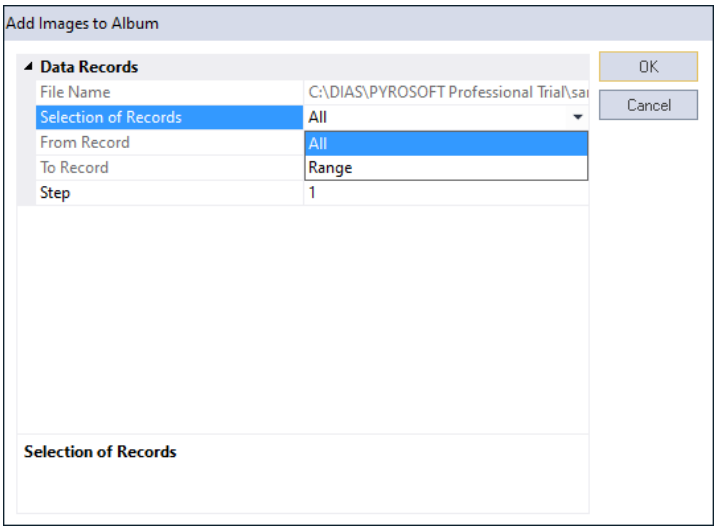
Menu item **[FILE > New: Album]** or the corresponding button on **Toolbar "Standard"** (see page **103**) opens a new blank album. Menu item **[FILE > Open]** loads an existing album file.

Only one album at a time may be opened.

Adding Data Records

To an open album, data records may be added by:

- Adding the current data record from an open IRDX or M8/TP8 file:
  Menu item **[FILE > Album > Add Current Image]** or **Toolbar "Album"** (see page **104**).
- Adding all or a selection of data records from an open IRDX sequence:
  Menu item **[FILE > Album > Add from Sequence]** or **Toolbar "Album"** (see page **104**). A dialog box is being opened to choose the required data records:



- Adding one or more single images:
  Menu item **[FILE > Album > Add from Files]** or **Toolbar "Album"** (see page **104**). A dialog box is being opened to choose the required IR files (selection of multiple files allowed)

New data records will always be added at the end of the album file.

Rearranging Data Records

To browse through the album use menu items

- **[FILE > Album > First Record]**,
- **[FILE > Album > Previous Record]**,
- **[FILE > Album > Next Record]**, and
- **[FILE > Album > Last Record]**.

The order of data records may be changed by moving the current data record:

- **[FILE > Album > Move Forward]** moves the current data record one step forward.
- **[FILE > Album > Move Backward]** moves the current data record one step backward.

Menu item **[FILE > Album > Delete Record]** removes the current data record from the album.

The aforementioned features may also be found on **Toolbar "Album"** (see page **104**).

CHAPTER 10

Creating Reports

Creating reports in **PYROSOFT Professional**

In this Chapter

Creating a Report

With **PYROSOFT Professional,** it is possible to create a thermal imaging report. To use this function, an installed version of Microsoft Word® (2000 or higher) is required.

There are two varieties of thermal imaging reports in **PYROSOFT Professional**:

- Single Report: The report consists of only one data record. A single report may be created from all IRDX or M8/TP8 files (see **Single Report** on page **89**).
- Multi Report: The report consists of multiple data records, originating from various sources. A multi report may be created only from IRDA files (see **Multi Report** on page **89**).

Single Report

A single report is created from an open IRDX or M8/TP8 file. Clicking menu item **[FILE > Report > Single Report]** or the corresponding button on **Toolbar "Report"** (see page **105**) starts the process.

First a report template (*.dot) has to be selected (see **Report Templates** on page **90**).

Afterwards all current measurement information and views are being applied to the template and a new report document opens in Microsoft Word®. This document may now be edited further, e.g. by deleting unneeded elements, adding comments, etc.

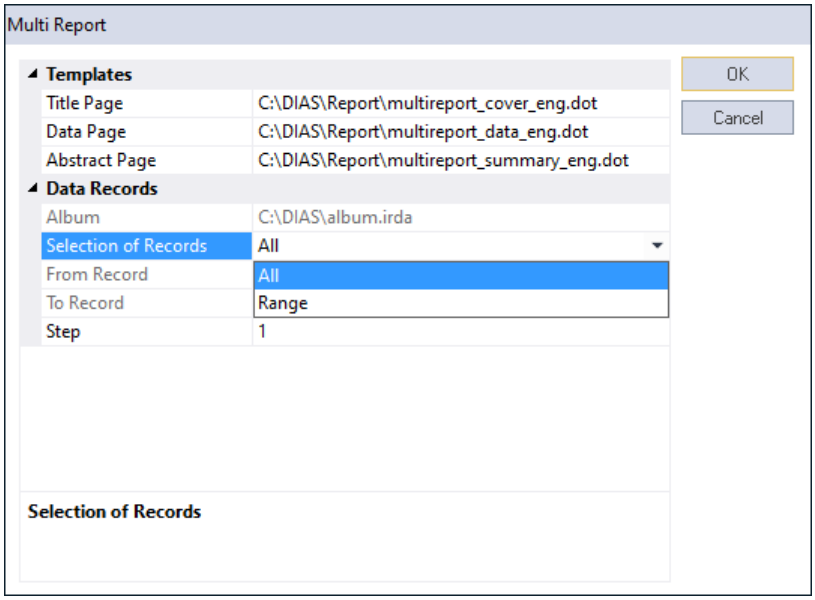
Multi Report

The following steps create a new multi report:

- Creating an album file (*.irda), containing all data records needed for the report (see **Album** on page **87**).
- Creating a multi report from the album file.

Opening an album, menu item **[FILE > Report > Multi Report]** or the corresponding button on **Toolbar "Report"** (see page **105**) starts the process of creating a new report.

The dialog box for report property settings is being displayed. Here, three templates for report title page, data sheet and summary (see **Report Templates** on page **90**) and the album data records needed for the report may be selected.



Afterwards, for every data record, all current measurement information and views are being applied to the data sheet template. The individual data pages are being put together, the title page being added as first, the summary as last page.

Finally, the ready-made report is being opened in Microsoft Word® and may now be edited further, e.g. by deleting unneeded elements, adding comments, etc.

Report Templates

Report templates are Microsoft Word® template files (*.dot). They contain the necessary report format settings and placeholders, that are being replaced by actual data when the report is created from the template.

For single reports there needs to be only one template with all relevant information.

For multi reports there need to be three separate templates. These are being put together to one final report by **PYROSOFT Professional**:

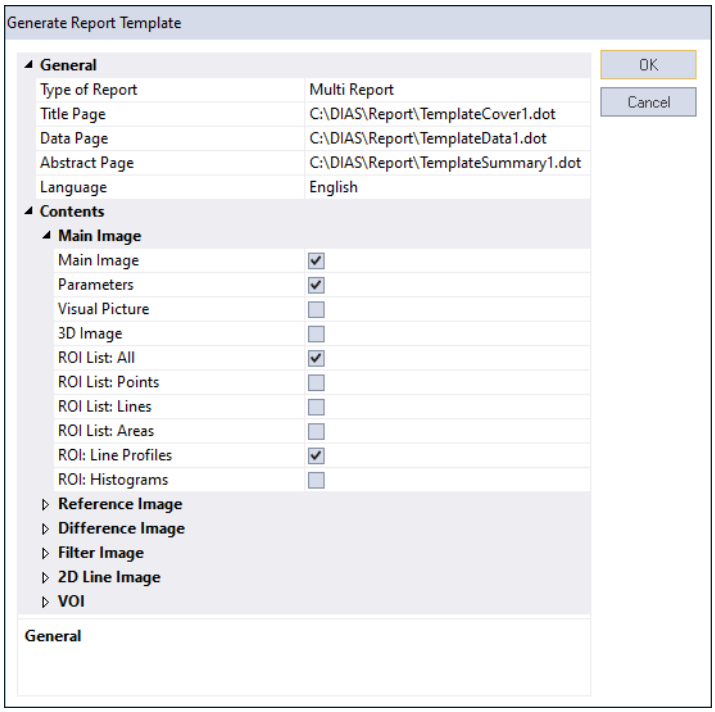
- A title page, containing general information (e.g. company logo, address, client information, etc.)
- A data page, containing the measurement data and views. For each album data record one data sheet will be added to the report.
- A summary page, containing comments and conclusions.

Creating a Report Template

During the installation of **PYROSOFT Professional,** a few sample templates are copied to the computer (subdirectory "\report"). Additionally customized templates may be created to adjust to individual applications, designed using one's own bitmaps and formatting.

There are several possibilities to create a customized report template:

- Open a new template file (*.dot) in Microsoft Word® and add the needed placeholders manually (see **Placeholders** on page **91**).
- Open and customize an existing sample template from subdirectory "\Report" in Microsoft Word® (menu item **[FILE > Report > Edit Report Template]** or Toolbar "Report" (see page 105)).
- Create a new report template in **PYROSOFT Professional** by using menu item **[FILE > Report > New Report Template]** or Toolbar "Report" (see page 105). The following dialog box is being opened:



Afterwards the new report template is being opened in Microsoft Word® and may now be edited further in order to customize layout and design.

Placeholders

Placeholders are being replaced by actual data when the report is created from the template.

The following types of placeholders are available:

- Text:
  May be inserted anywhere in the document.
- Bitmap:
  Must be set inside a text field. The size of the text field specifies the size of the inserted bitmap.
- Table:
  Must be set in the first row of a table with only one column. The table format is being adopted.

The following placeholders are available:

- General parameters

Parameter	Placeholder	Type
File Name	<<IRR_FILE.Name>>	Text
Source IRDX File (multi report from album)	<<IRR_FILE.Source>>	Text
Number of Data Records	<<IRR_FILE.NumRecords>>	Text
Current Data Record	<<IRR_FILE.ActRecord>>	Text
Camera Type	<<IRR_CAMERA.DeviceName>	Text
Camera ID	<<IRR_CAMERA.DeviceID>>	Text
Acquisition Date	<<IRR_ACQUISITION.Date>>	Text
Acquisition Time	<<IRR_ACQUISITION.Time>>	Text
Measurement Range	<<IRR_ACQUISITION.MRange>>	Text
Image Frequency	<<IRR_ACQUISITION.Rate>>	Text

Visual Image	<<IRR_VISIMAGE>>	Bitmap

- Parameters and elements of the main image

Parameter	Placeholder	Type
Emissivity	<<IRR_MAINIMAGE.Emissivity>>	Text
Transmittance	<<IRR_MAINIMAGE.Transmission>>	Text
Ambient Temperature	<<IRR_MAINIMAGE.AmbientTemp>>	Text
Main Image	<<IRR_MAINIMAGE.Image>>	Bitmap
3D Image	<<IRR_MAINIMAGE.3DImage>>	Bitmap
Scale	<<IRR_MAINIMAGE.Scale>>	Bitmap
Image Minimum	<<IRR_MAINIMAGE.Minimum>>	Text
Image Maximum	<<IRR_MAINIMAGE.Maximum>>	Text
Image Average	<<IRR_MAINIMAGE.Average>>	Text
ROI Table: All	<<IRR_MAINIMAGE.ROITableAll>>	Table
ROI Table: Points	<<IRR_MAINIMAGE.ROITablePoints>>	Table
ROI Table: Lines	<<IRR_MAINIMAGE.ROITableLines>>	Table
ROI Table: Areas	<<IRR_MAINIMAGE.ROITableAreas>>	Table
ROI Profiles	<<IRR_MAINIMAGE.ROIProfiles>>	Bitmap

- Parameters and elements of the reference image

Parameter	Placeholder	Type
Emissivity	<<IRR_REFIMAGE.Emissivity>>	Text
Transmittance	<<IRR_REFIMAGE.Transmission>>	Text
Ambient Temperature	<<IRR_REFIMAGE.AmbientTemp>>	Text
Reference Image	<<IRR_REFIMAGE.Image>>	Bitmap
Reference 3D Image	<<IRR_REFIMAGE.3DImage>>	Bitmap
Scale	<<IRR_REFIMAGE.Scale>>	Bitmap
Image Minimum	<<IRR_REFIMAGE.Minimum>>	Text
Image Maximum	<<IRR_REFIMAGE.Maximum>>	Text
Image Average	<<IRR_REFIMAGE.Average>>	Text
ROI Table: All	<<IRR_REFIMAGE.ROITableAll>>	Table
ROI Table: Points	<<IRR_REFIMAGE.ROITablePoints>>	Table
ROI Table: Lines	<<IRR_REFIMAGE.ROITableLines>>	Table
ROI Table: Areas	<<IRR_REFIMAGE.ROITableAreas>>	Table
ROI Profiles	<<IRR_REFIMAGE.ROIProfiles>>	Bitmap

- Parameters and elements of the difference image

Parameter	Placeholder	Type
Difference Image	<<IRR_DIFFIMAGE.Image>>	Bitmap
Difference 3D Image	<<IRR_DIFFIMAGE.3DImage>>	Bitmap
Scale	<<IRR_DIFFIMAGE.Scale>>	Bitmap
Image Minimum	<<IRR_DIFFIMAGE.Minimum>>	Text
Image Maximum	<<IRR_DIFFIMAGE.Maximum>>	Text
Image Average	<<IRR_DIFFIMAGE.Average>>	Text

ROI Table: All	<<IRR_DIFFIMAGE.ROITableAll>>	Table
ROI Table: Points	<<IRR_DIFFIMAGE.ROITablePoints>>	Table
ROI Table: Lines	<<IRR_DIFFIMAGE.ROITableLines>>	Table
ROI Table: Areas	<<IRR_DIFFIMAGE.ROITableAreas>>	Table
ROI Profiles	<<IRR_DIFFIMAGE.ROIProfiles>>	Bitmap

- Parameters and elements of the filter image

Parameter	**Placeholder**	**Type**
Emissivity	<<IRR_FILTERIMAGE.Emissivity>>	Text
Transmittance	<<IRR_FILTERIMAGE.Transmission>>	Text
Ambient Temperature	<<IRR_FILTERIMAGE.AmbientTemp>>	Text
Filter Image	<<IRR_FILTERIMAGE.Image>>	Bitmap
Filter 3D Image	<<IRR_FILTERIMAGE.3DImage>>	Bitmap
Scale	<<IRR_FILTERIMAGE.Scale>>	Bitmap
Image Minimum	<<IRR_FILTERIMAGE.Minimum>>	Text
Image Maximum	<<IRR_FILTERIMAGE.Maximum>>	Text
Image Average	<<IRR_FILTERIMAGE.Average>>	Text
ROI Table: All	<<IRR_FILTERIMAGE.ROITableAll>>	Table
ROI Table: Points	<<IRR_FILTERIMAGE.ROITablePoints>>	Table
ROI Table: Lines	<<IRR_FILTERIMAGE.ROITableLines>>	Table
ROI Table: Areas	<<IRR_FILTERIMAGE.ROITableAreas>>	Table
ROI Profiles	<<IRR_FILTERIMAGE.ROIProfiles>>	Bitmap

- Parameters and elements of the 2D line image

Parameter	**Placeholder**	**Type**
Emissivity	<<IRR_2DLINEIMAGE.Emissivity>>	Text
Transmittance	<<IRR_2DLINEIMAGE.Transmission>>	Text
Ambient Temperature	<<IRR_2DLINEIMAGE.AmbientTemp>>	Text
Filter Image	<<IRR_2DLINEIMAGE.Image>>	Bitmap
Filter 3D Image	<<IRR_2DLINEIMAGE.3DImage>>	Bitmap
Scale	<<IRR_2DLINEIMAGE.Scale>>	Bitmap
Image Minimum	<<IRR_2DLINEIMAGE.Minimum>>	Text
Image Maximum	<<IRR_2DLINEIMAGE.Maximum>>	Text
Image Average	<<IRR_2DLINEIMAGE.Average>>	Text
ROI Table: All	<<IRR_2DLINEIMAGE.ROITableAll>>	Table
ROI Table: Points	<<IRR_2DLINEIMAGE.ROITablePoints>>	Table
ROI Table: Lines	<<IRR_2DLINEIMAGE.ROITableLines>>	Table
ROI Table: Areas	<<IRR_2DLINEIMAGE.ROITableAreas>>	Table
ROI Profiles	<<IRR_2DLINEIMAGE.ROIProfiles>>	Bitmap

- Parameters and elements for VOI

Parameter	**Placeholder**	**Type**
VOI Table: All	<<IRR_VOITableAll>>	Table
VOI Table: Values	<<IRR_VOITableValues>>	Table
VOI Table: Alarms	<<IRR_VOITableAlarms>>	Table

VOI Table: Alarm Combinations	<<IRR_VOITableAlarmCombinations>>	Table
VOI Trend	<<IRR_VOITrend1>>	Bitmap

CHAPTER 11

Program Settings

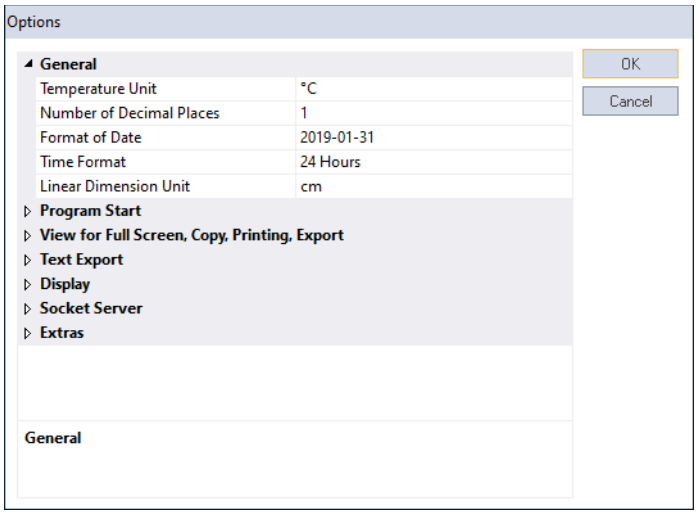
Program settings of **PYROSOFT Professional**

In this Chapter

Program settings may be modified in menu item **[EXTRAS > Options]**. Data acquisition has to be deactivated.
Menu item **[EXTRAS > Reset Settings]** resets all settings to default values.

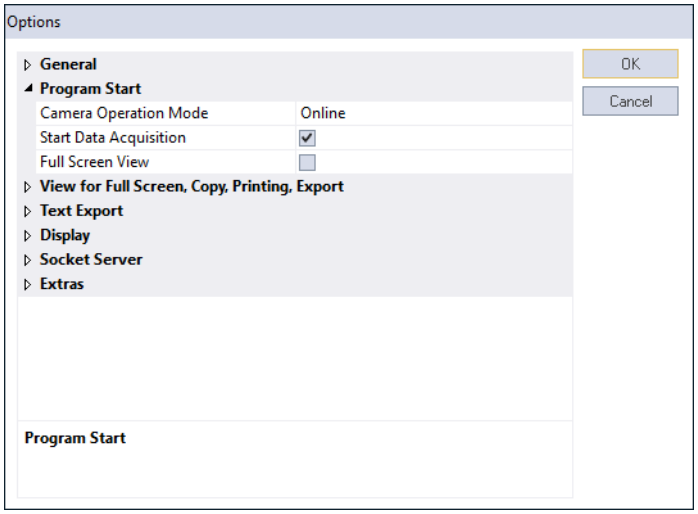
General

General parameters and settings:



Program Start

Program start settings:

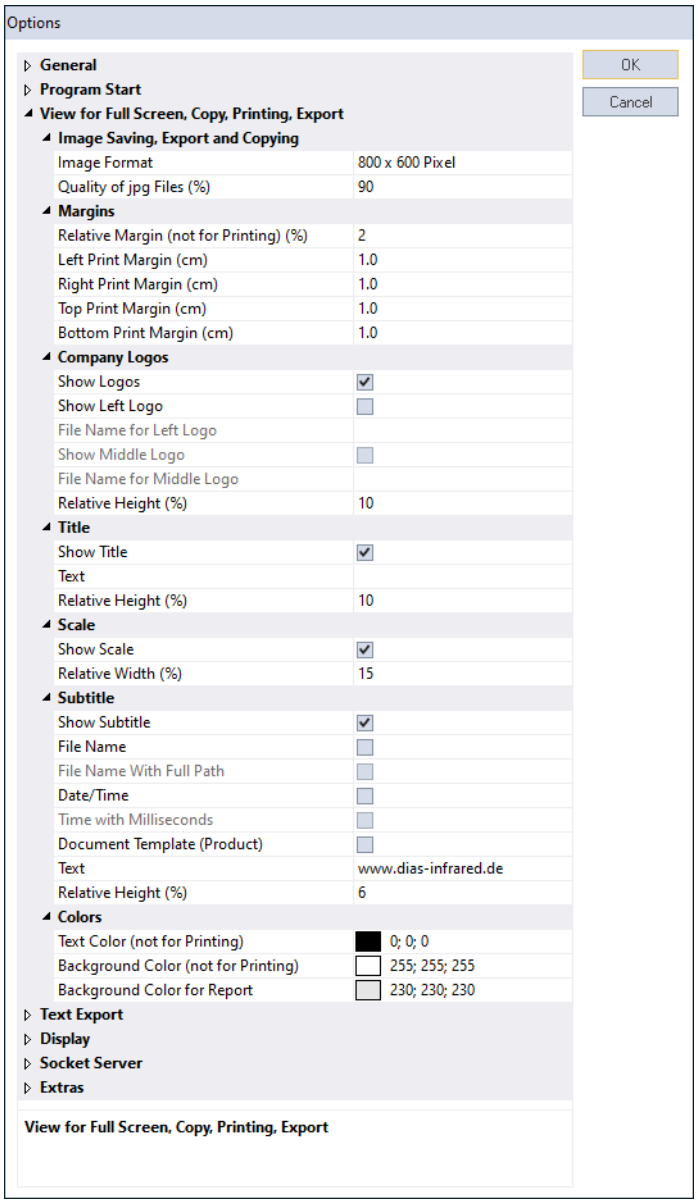


PYROSOFT Professional may be started in online or offline mode. Choosing online mode, it is possible to show the full screen view on program start. The add-on program **SetDetect.exe** (see **Add-on Programs and Troubleshooting** on page **101**) helps to configure the interface for the camera search.

View for Full Screen, Copy, Printing, Export

Settings for the following categories:

- Bitmap Export and Copy
- Margins
- Company Logos: (32-Bit *.bmp file)
- Title
- Scale
- Subtitle
- Colors

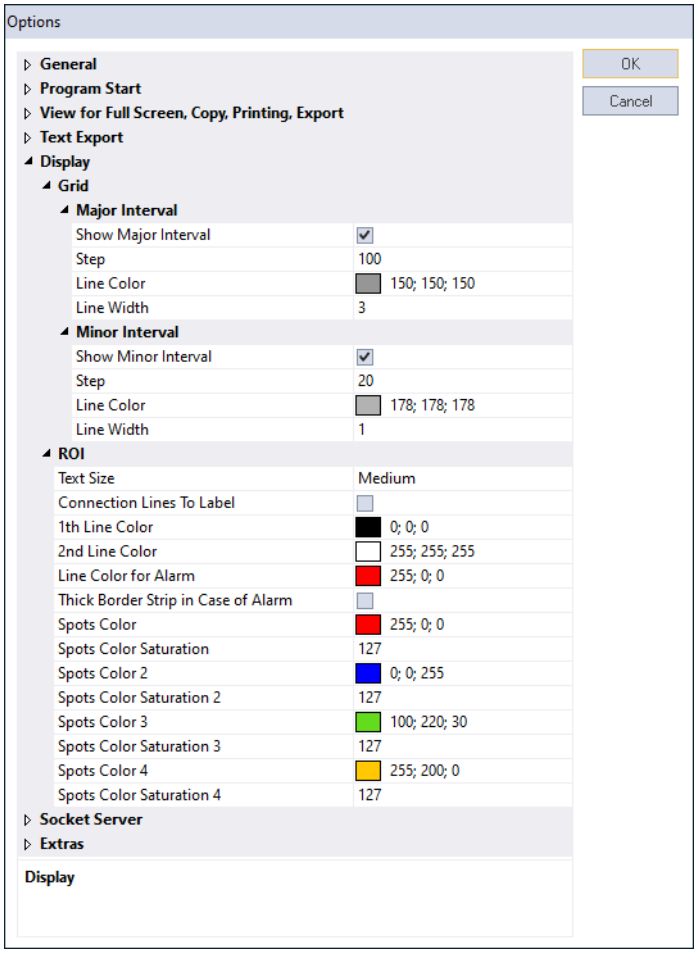


Text Export

Check this box if you want text files to be written in UTF-8 format.

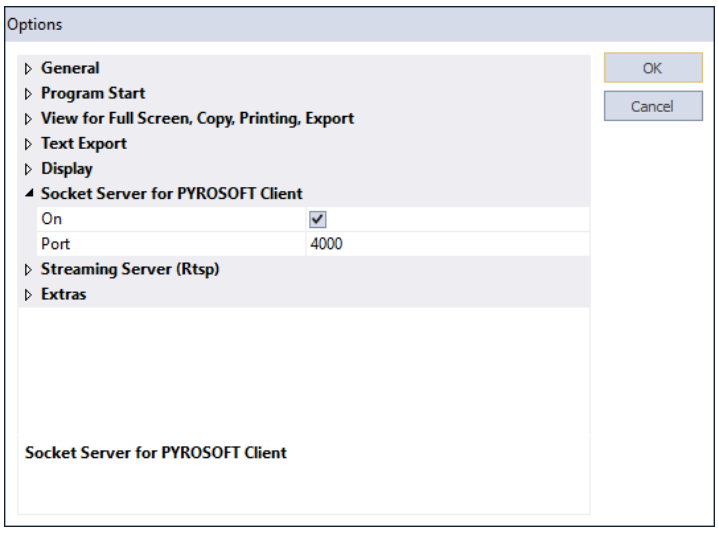
Display

Grid and ROI display settings.



Socket Server

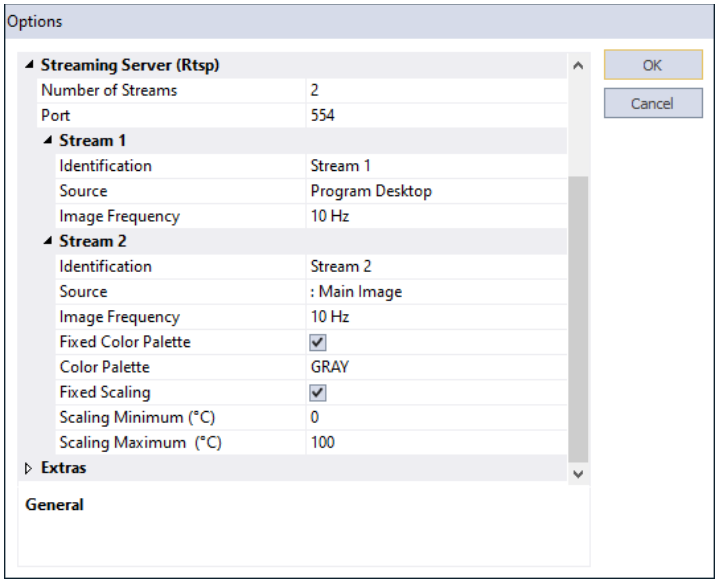
The software **PYROSOFT Client** allows to retrieve and display current data from **PYROSOFT Professional**. For that purpose the option "Socket Server for PYROSOFT Client" has to be activated in **PYROSOFT Professional**.



RTSP Streaming

The software **PYROSOFT Professional** allows to send image data as RTSP stream. The following data are available for streaming:

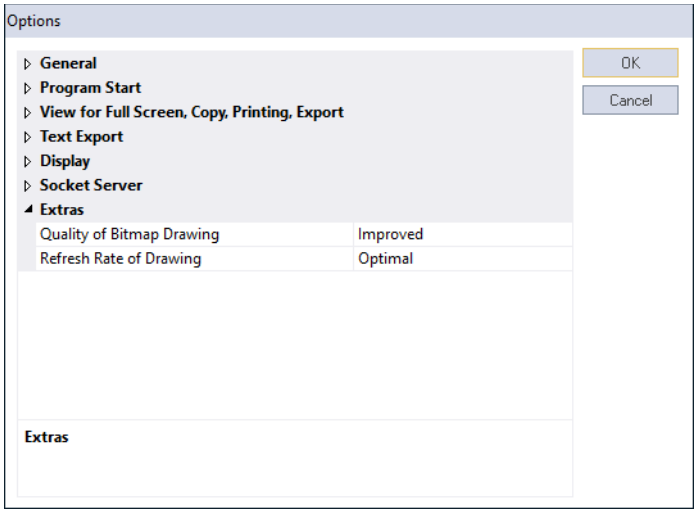
- Program desktop as a whole
- Main Image
- Difference Image
- Filter Image
- 2D Line Image
- Projection Image
- Trigger Image
- Live Image (fastest option, data straight from the camera, without ROI)



Please note: Changes become active only after the next program start!

Extras

Depending on the processors performance and capacity, it is possible to optimize the drawing quality and the drawing refresh rate.



CHAPTER 12

Add-on Programs and Troubleshooting

The add-on programs provide various functions for configuring software and cameras:

- SetIP.exe:
  Read-out and change the camera's network configuration
- CamConfig.exe:
  Configuration of the camera's inputs and outputs
- CamDiag.exe:
  Camera diagnosis and functional test of the camera's digital inputs and outputs
- SetDetect.exe:
  Change **PYROSOFT** camera detection parameters
- SetSWLicence.exe
  Register software licenses
- IOConfig.exe:
  Integrate IO systems and pyrometers into **PYROSOFT** (only if IO system use is supported)

PYROSOFT Professional add-on programs may be found in menu **[EXTRAS > External Tools]** or may be started in the program group **DIAS\PYROSOFT Professional\Tools** or directly from the program directory "**DIAS\PYROSOFT Professional\Tools**".

For further information on the add-on programs and troubleshooting tips, please refer to the PYROSOFT Add-on Programs and Troubleshooting manual.

The manual PYROSOFT IO System and Pyrometers gives more information on integrating IO systems and pyrometers into **PYROSOFT** using IOConfig.exe.

CHAPTER 13

Appendix

In this Chapter

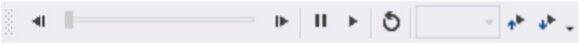
Toolbars

Toolbar "Standard"

The associated menu items are located in menu **[FILE]**:

- New: Online document
- New: Album
- Open file
- Previous file in directory
- File index in directory
- Next file in directory
- Maintain Scaling
- Save file
- Copy
- Print
- Print preview

Toolbar "Data Player"



The associated menu items are located in menu **[FILE > Data Player]**:

- Previous data record
- Current data record (Slider)
- Next data record
- Stop/continue player
- Start player
- Repeat player (loop)
- Player speed (relative)
- Increase player speed
- Decrease player speed

Toolbar "Image Memory"

The associated menu items are located in menu **[FILE > Image Memory]**:

- Readout image memory
- Delete image memory

For further information see **Internal Image Memory of a Portable Camera** on page **31**.

Toolbar "Data Acquisition"

The associated menu items are located in menu **[DATA ACQUISITION]** or in **Property Pane "Parameters"** (see page **107**):

- Acquisition frequency
- Stop data acquisition
- Start data acquisition
- Shutter procedure (if the camera works with a shutter)
- Motor focus: Move to close-up range (if the camera is equipped with a motor focus)
- Motor focus: Move to far field (if the camera is equipped with a motor focus)
- Motor focus: Move one step into close-up range (if the camera is equipped with a motor focus)
- Motor focus: Move one step into far field (if the camera is equipped with a motor focus)
- Switch on/off online data saving
- Save current image
- Switch on/off online data saving for 2D line image
- Switch on/off online data saving for history
- Switch on/off online alarm data saving

Toolbar "View"

The associated menu items are located in menu **[VIEW]**:

- Current viewing size
- Zoom in
- Zoom out
- Auto-size
- Full screen
- Grid
- Rotate 90° left/right
- Flip horizontally/vertically
- Show point temperature

Toolbar "Album"

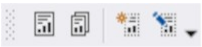
The associated menu items are located in menu **[FILE > Album]**:

- Add current image
- Add images
- Add files
- First record
- Previous record
- Number of current data record
- Next record
- Last record

- Move forward
- Move backward
- Delete record

For further information see **Album** on page **87**.

Toolbar "Report"



The associated menu items are located in menu **[FILE > Report]**:

- Create single report
- Create multi report
- New report template
- Edit report template

For further information see **Creating Reports** on page **89**.

Toolbar "ROI"

The associated menu items are located in menu **[ROI]**:

- Select ROI (to switch from point temperature to ROI)
- Insert point
- Insert line
- Insert rectangle
- Insert ellipse/circle
- Insert polygon
- Undo ROI action
- Copy selected ROI
- Insert copied ROI
- Duplicate selected ROI
- Delete selected ROI
- Select all ROI
- ROI properties (list)
- Load ROI from file
- Save ROI to file
- Show/hide ROI
- Show/hide ROI labels
- Show/hide ROI minima
- Show/hide ROI maxima
- Show/hide ROI alarm (Marks the ROI-border where alarm was activated)
- Move selected ROI one step closer to the front
- Move selected ROI one step toward the back
- Move selected ROI to the front
- Move selected ROI to the back

For further information see **ROI – "Region of Interest"** on page **40**.

Toolbar "ROI: Groups"

The toolbar "ROI: Groups" is not contained in the standard layout, but can, if required, be shown by using the menu items **[VIEW > Toolbars]** or right-click on the toolbars.

The associated menu items are located in menu **[ROI > Groups]**:

- Show/hide all ROI

- Show/hide group 1 to group 8
- Define groups

For further information see **Groups of ROI** on page **46**.

Toolbar "ROI: Move All"

The toolbar "ROI: Move All" is not contained in the standard layout, but can, if required, be shown by using the menu items **[VIEW > Toolbars]** or right-click on the toolbars.

The associated menu items are located in menu **[ROI > Move All]**:

- Move all ROI to the left/right/top/bottom

Toolbar "VOI"

The associated menu items are located in menu **[VOI]**:

- Insert VOI value
- Insert VOI alarm
- Insert VOI alarm combination
- VOI properties
- Load VOI from file
- Save VOI to file
- Reset alarm counter
- Confirm all alarms

For further information see **VOI – "Value of Interest"** on page **51**.

Toolbar "VOI: Teach-In"

The toolbar "VOI: Teach-In" is not contained in the standard layout, but can, if required, be shown by using the menu items **[VIEW > Toolbars]** or right-click on the toolbars.

The associated menu items are located in menu **[VOI > Teach-In]**:

- Switch min/max off for all images
- Switch min/max on for all images
- Switch min/max on for current image
- Update min/max
- Delete min/max
- Set thresholds
- Correct thresholds

For further information see **Teach-In for VOI Alarms** on page **58**.

Toolbar "Language"

The associated menu items are located in menu **[EXTRAS > Language]**:

- German
- English
- French
- Spanish
- Italian
- Japanese
- Chinese

Languages not available will be deactivated automatically.

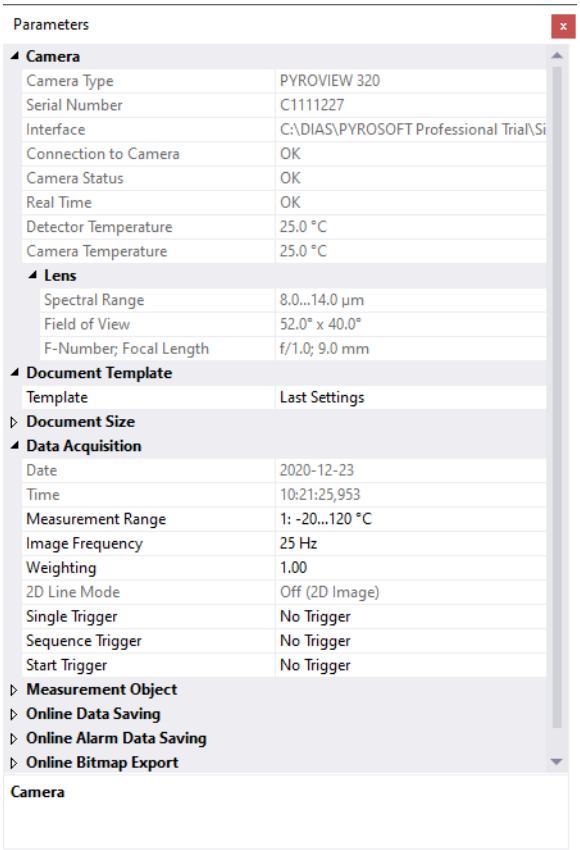
Property Panes

Property Pane "Parameters"

In default layout, the Property Pane "Parameters" is located at the upper left of the program desktop.

It contains information and possible settings for the measurement document. Depending on the document type (online or offline document) and the camera type, there are different categories, entries and possible settings available.

- IO System (only with activated IO system)
- File (only with offline documents)
- Camera
- Document Template (only with online documents)
- Document Size
- Data Acquisition
- Measurement Object
- Online Data Saving (only with online documents)
- Online Alarm Data Saving (only with online documents)
- Online Bitmap Export (only with online documents)

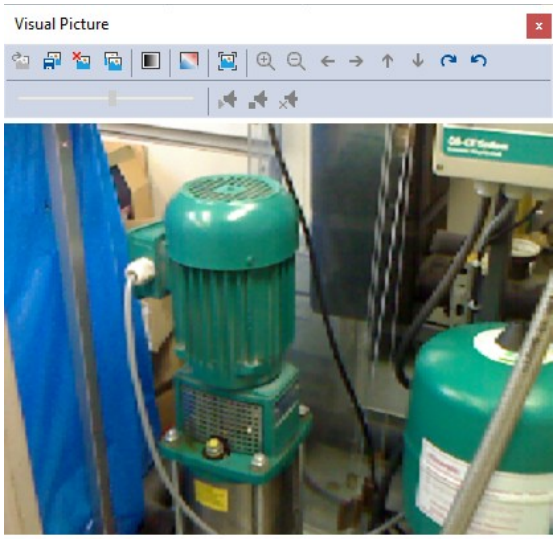


Property Pane "Visual Picture"

In default layout, the Property Pane "Visual Picture" is located at the lower left side of the program desktop.

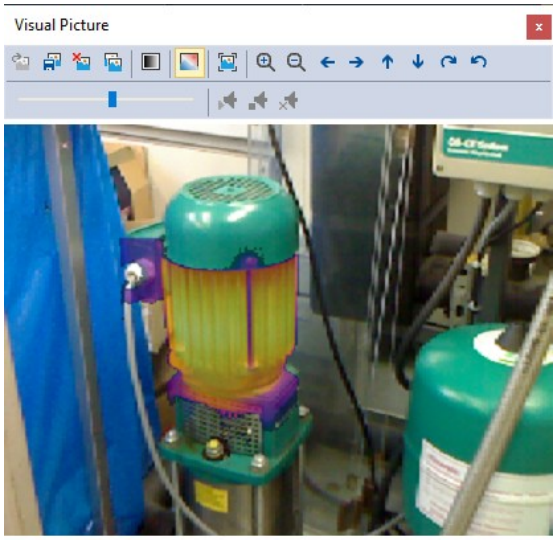
If a visual picture was saved with the document, it is being displayed and can be

changed.



In addition, it is possible to overlap the displayed visual picture and the corresponding infrared image.

Example: IR image overlapping visual picture



The toolbar contains the following possible actions:

- Add picture
- Save picture
- Delete picture
- Copy picture
- Visual black/white
- Overlapping with IR image
- Reset
- Zoom in IR
- Zoom out IR
- IR to the left
- IR to the right
- IR to top
- IR to bottom
- Rotate visual image (clockwise)
- Rotate visual image (counter-clockwise)
- Slide control for transparency
- Play audio comment

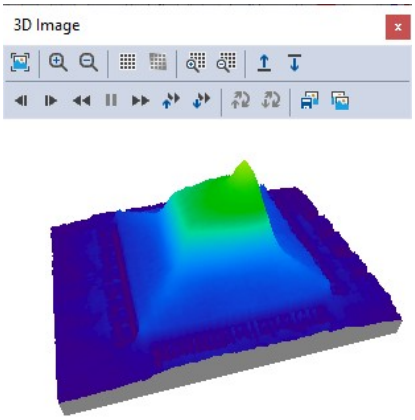
- Stop audio comment
- Delete audio comment

Property Pane "3D Image"

The Property Pane "3D Image" is not contained in the default layout.

If required, it can be opened in menu item **[VIEW > 3D Image]** and is then located at the lower left side of the program desktop.

The current measurement document is displayed as 3D image.



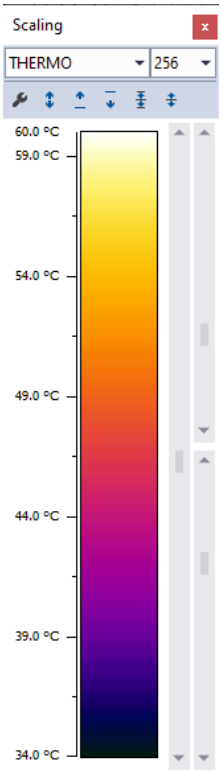
The toolbar contains the following possible actions:

- Reset view
- Zoom in/Zoom out
- Grid on/off
- Increase/decrease resolution
- Adjust surface (level, rotation)
- Increase/decrease update interval
- Copy/save picture

Property Pane "Scaling"

In default layout, the Property Pane "Scaling" is located at the right side of the program desktop.

The scaling set in the active image window is displayed and can be changed.



The toolbar contains the following possible actions:

- Select color bar
- Select number of colors
- Open the dialog box for scaling property settings
- Auto scaling min/max
- Auto scaling max
- Auto scaling min
- Auto scaling average +/- fix
- Auto scaling average +/- dynamic

If the manual scaling is used, the following sliders can be used to modify the settings:

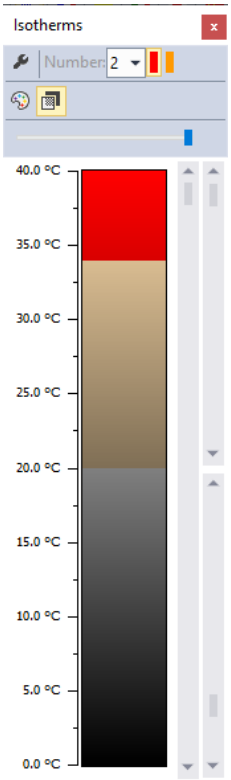
- Upper right slider: Adjust maximum
- Lower right slider: Adjust minimum
- Left slider: Adjust range (maximum and minimum are moved up or down simultaneously)

Property Pane "Isotherms"

The Property Pane "Isotherms" is not contained in the default layout.

If required, it can be opened in menu item **[VIEW > Isotherms]** and is then located at the right side of the program desktop.

The isotherms set in the active image window are displayed and can be changed, see **Isotherms** on page **71**.



The toolbar contains the following possible actions:

- Open the isotherms property dialogue (Overview of scaling, view settings and temperature limits)
- Number of isotherms (Maximum: 5)
- Select isotherm number to change its appearance
- Color of selected isotherm
- Choose isotherm appearance between <Transparent> or <Saturated Color>
- Select color saturation by using the horizontal slider in the toolbar

The vertical sliders adjust the maximum and minimum settings of the current isotherm:

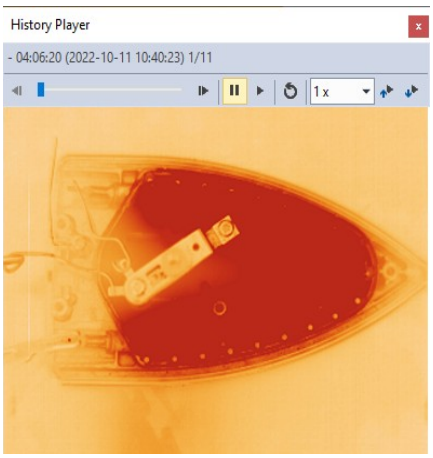
- Upper right slider: Adjust maximum
- Lower right slider: Adjust minimum
- Left slider: Adjust range (maximum and minimum are moved up or down simultaneously)

Property Pane "History Player"

The Property Pane "History Player" is not contained in the default layout.

If required, it can be opened in menu item **[WINDOW > History > Player]** and is then located at the right side of the program desktop.

The player allows you to browse through the existing history images (see **History** on page **76**). For each record, the acquisition time, the image number and the total number of images in the history are displayed.



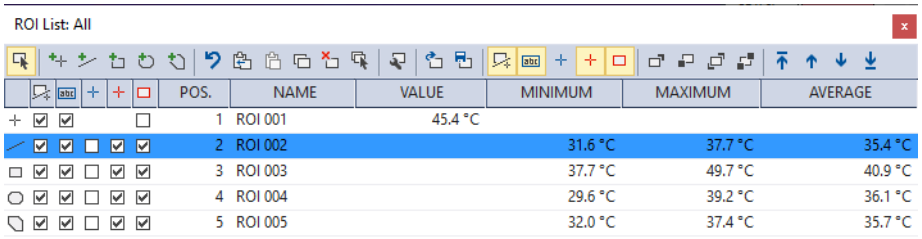
The toolbar contains the following possible actions:

- Navigating through the data sets
- Start / stop player
- Repeat
- Set player speed

Property Pane "ROI Lists"

In default layout, these Property Panes are located at the lower side of the program desktop. They can be opened using Menu **[VIEW > ROI Windows]**.

The ROI list for all ROI ("ROI List: All") or for each of the ROI types (points, lines and areas) associated with the active image window is displayed and can be adjusted, see **ROI – "Region of Interest"** on page **40**.



- The first column displays the ROI type.
- The five check boxes to the right can be used to select the ROI display modes (Show or hide the ROI/ label/minimum/maximum/alarm) (see **Show ROI in the Image Window** on page **45**)
- The following columns show ROI values and parameter. By default, only a selection of the possible columns is diplayed. By right-clicking on the table header, the selection can be changed.

The following actions are available:

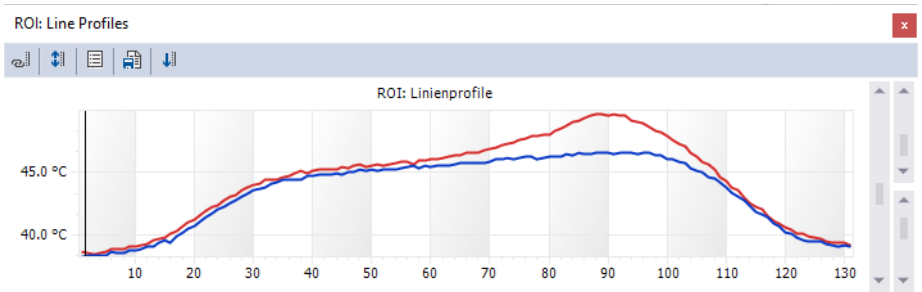
- Left click on a row:
  Selects a ROI, also possible by clicking on the ROI in the image window.
  With "Shift" or "Ctrl" key on hold, several ROI may be selected.
- Left double click on a row:
  Opens the dialog box for ROI property settings (see **Properties of ROI** on page **43**).
- Right click on a row:
  Opens a drop down menu for changing list order or deleting entries.
- Right click on the table header:
  Opens a drop down menu for selecting the displayed columns.

The toolbar displays the same functions as the **Toolbar "ROI"** (see page **105**) and additional buttons to change the order of the list.

Property Pane "ROI: Line Profiles"

In default layout, the Property Pane "ROI-List: Line Profiles" is located at the lower side of the program desktop.

The ROI line profiles associated with the active image window are displayed, see **ROI – "Region of Interest"** on page **40**.



Moving the cursor over the chart displays the temperature values at the current position. Press the Shift key to move the cursor with the mouse.

The toolbar contains the following possible actions:

- Linked scaling on/off:
  If linked scaling is activated, the scaling of the active image window is used.
- Automatic scaling on/off

- Show legend
- Export line profiles to a text file
- Reverse Y-axis

If manual scaling is applied, the following sliders may be used to modify the settings:

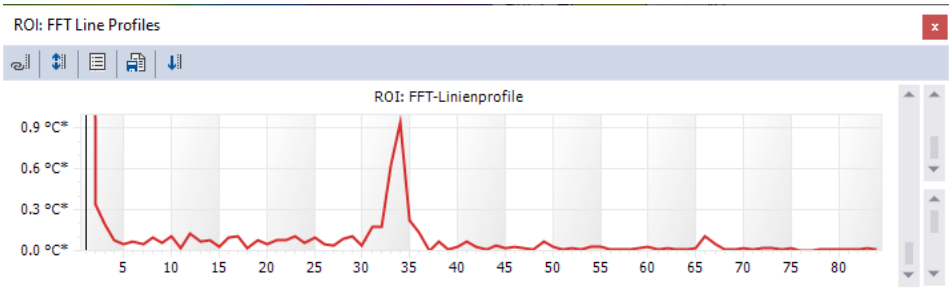
- Upper right slider: adjust maximum
- Lower right slider: adjust minimum
- Left slider: Adjust range (maximum and minimum are moved up or down simultaneously)

Property Pane "ROI: FFT Line Profiles"

The Property Pane "ROI: FFT Line Profiles" is not contained in the default layout.

If required, it can be opened in menu item **[VIEW > ROI Windows > ROI: FFT Line Profiles]** and is then located at the lower side of the program desktop.

The FFT diagram of the ROI lines associated with the active image window are displayed, see **FFT** on page **68**.



The toolbar contains the following possible actions:

- Linked scaling on/off:
  If linked scaling is activated, the scaling of the active image window is used.
- Automatic scaling on/off
- Show legend
- Export FFT line profiles to a text file

If manual scaling is applied, the following sliders may be used to modify the settings:

- Upper right slider: Adjust maximum
- Lower right slider: Adjust minimum
- Left slider: Adjust range (maximum and minimum are moved up or down simultaneously)

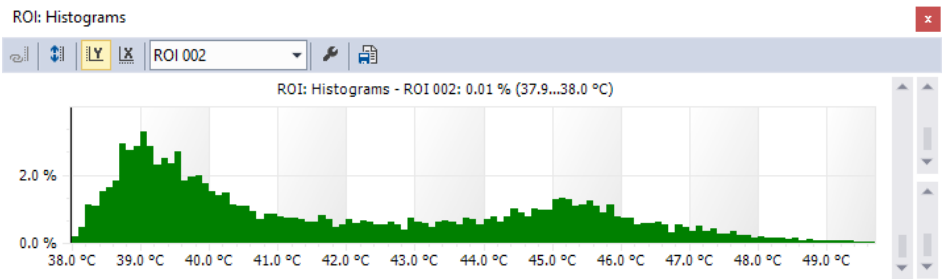
Moving the cursor over the chart displays the X axis value at the current position. Press the Shift key to move the cursor with the mouse.

Property Pane "ROI: Histograms"

The Property Pane "ROI: Histograms" is not contained in the default layout.

If required, it can be opened in menu item **[VIEW > ROI Windows > ROI: Histograms]** and is then located at the lower side of the program desktop.

A selected ROI histogram, which is associated with the active image window, is displayed, see **Histograms** on page **64**.



Moving the cursor over the chart displays the histogram values at the current position. Press the Shift key to move the cursor with the mouse.

The toolbar contains the following possible actions:

- Linked scaling on/off:
  If linked scaling is applied, the X-axis scaling of the active image window will be used.
- Auto scaling on/off
- Select Y-axis
- Select X-axis
- Select ROI
- Open ROI properties dialog
- Text export

If manual scaling is applied, the following sliders may be used to modify the settings:

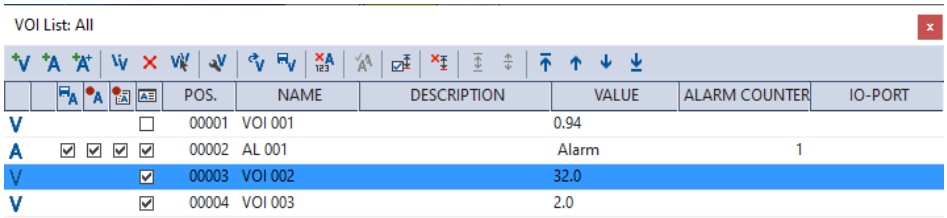
- Upper right slider: Adjust maximum
- Lower right slider: Adjust minimum
- Left slider: Adjust range (maximum and minimum are moved up or down simultaneously).

Property Pane "VOI Lists"

In default layout, the Property Panes "VOI Lists" are located at the lower side of the program desktop.

The ROI line profiles associated with the active document are displayed and can be changed, see **VOI – "Value of Interest"** on page **51**.

Menu **[VIEW > VOI Windows]** opens VOI lists for all or for each of the following VOI types: values, alarms and alarm combinations.



- The first column displays the VOI type
- The second column shows a red exclamation mark "!" in case of an invalid combination or an error
- The following check boxes may be used to activate/deactivate the:
  - Online alarm data saving per VOI (see **Online Alarm Data Saving** on page **27**)
  - Online alarm logging per VOI (see **Property Pane "VOI List: Online Alarm Logging"** on page **115**)
  - Alarm message per VOI (see **Alarm Messages** on page **62**)
  - Online VOI export per VOI (see **Online Alarm Data Saving** on page **27**)

The following actions are available:

- Left double click on a row:
  Opens a dialog box for VOI property settings depending on the VOI types:
  - **Properties of VOI Values** on page **52**
  - **Properties of VOI Alarms** on page **55**
  - **Properties of VOI Alarm Combinations** on page **60**
- Right click on a row:
  Opens a drop down menu for changing list order or deleting entries.
- Right click on a headline:
  Opens a drop down menu for selecting the displayed columns.

The toolbar contains the following possible actions:

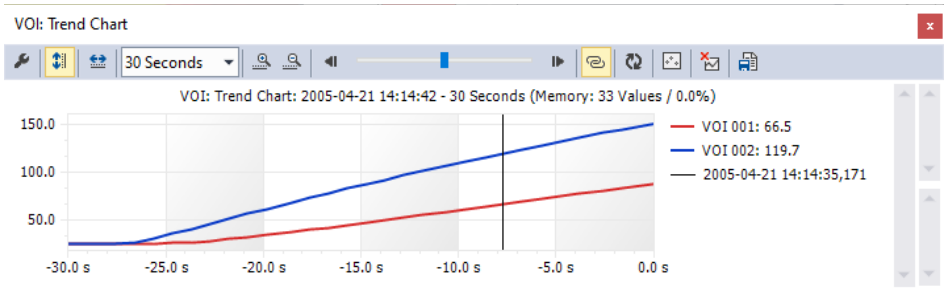
- Insert VOI value
- Insert VOI alarm
- Insert VOI alarm combination
- Duplicate VOI
- Delete VOI
- Select all VOI
- Open "VOI Properties" dialog
- Load VOI from file
- Save VOI to file
- Reset alarm counter
- Confirm all alarms
- Switch min/max on for current image
- Delete min/max values
- Set thresholds
- Correct thresholds
- List entry to first position
- List entry one position up
- List entry one position down
- List entry to last position

Property Pane "VOI: Trend Chart"

In default layout, the Property Pane "VOI-Trend Chart" is located at the lower side of the program desktop.

The trend profile shows the time course of one or more VOI values. Click on the "Trend Properties" icon and select the desired VOI as the trend calculation data source.

The corresponding VOI trend charts are displayed and can be changed, see **Trend Charts** on page **64**.



The selected time span is displayed in the title.

The black cursor can be moved to a desired position. The corresponding time stamp is displayed on the right. Press the Shift key to move the cursor with the mouse.

To calculate the time difference between two points, use the Ctrl key and the mouse to place the pink cursor at the desired position. Now the time difference between black and pink cursor is also displayed on the right:

The toolbar contains the following possible actions:

- Trend properties:
  Opens a dialog box for selecting the displayed trends and the online update frequency.
- Enable/disable automatic scaling
- Automatic time span
- Select time span
- Decrease time span
- Increase time span
- Previous time span
- Next time span
- Link to data player:
  If the link to the data player is active, the cursor in the trend chart will show the associated data record in the image window.
- Refresh:
  Recalculates the trend chart.
- Measuring points as cross:
  Switches between line or point display.
- Delete trend data
- Export line profiles to text file

If manual scaling is applied, the following sliders may be used to modify the settings:

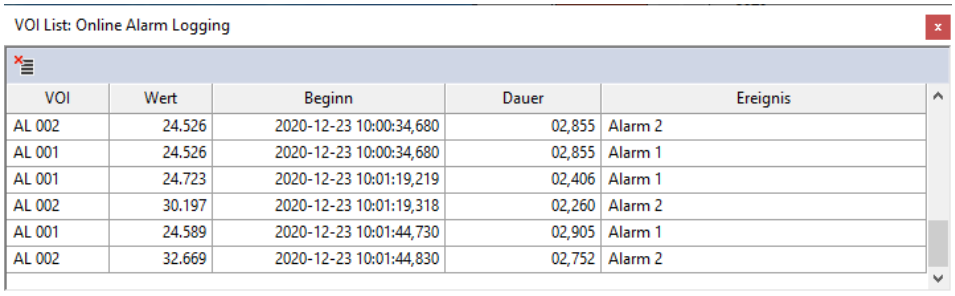
- Upper right slider: Adjust maximum
- Lower right slider: Adjust minimum
- Left slider: Adjust range (maximum and minimum are moved up or down simultaneously).

Property Pane "VOI List: Online Alarm Logging"

The Property Pane "VOI List: Online Alarm Logging" is not contained in the default layout.

If required, it can be opened in menu item **[VIEW > VOI Windows > VOI List: Online Alarm Logging]** and is then located at the lower side of the program desktop.

The logged VOI alarms or alarm combinations are displayed. The display is limited to the last 1000 entries.



VOI	Wert	Beginn	Dauer	Ereignis
AL 002	24.526	2020-12-23 10:00:34,680	02,855	Alarm 2
AL 001	24.526	2020-12-23 10:00:34,680	02,855	Alarm 1
AL 001	24.723	2020-12-23 10:01:19,219	02,406	Alarm 1
AL 002	30.197	2020-12-23 10:01:19,318	02,260	Alarm 2
AL 001	24.589	2020-12-23 10:01:44,730	02,905	Alarm 1
AL 002	32.669	2020-12-23 10:01:44,830	02,752	Alarm 2

The toolbar contains the following possible actions:

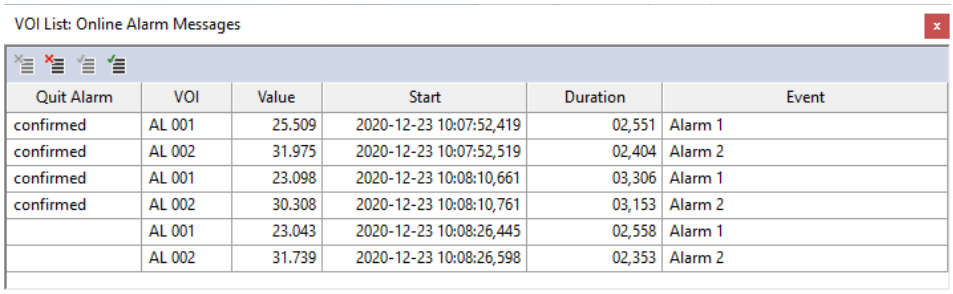
- Delete all entries

Property Pane "VOI List: Online Alarm Messages"

The Property Pane "VOI List: Online Alarm Messages" is not contained in the default layout.

If required, it can be opened in menu item **[VIEW > VOI Windows > VOI List: Online Alarm Messages]** and is then located at the lower side of the program desktop.

Alarm messages of VOI alarms and alarm combinations are displayed. The display is limited to the last 1000 entries - see **Alarm Messages** on page **62**.



Quit Alarm	VOI	Value	Start	Duration	Event
confirmed	AL 001	25.509	2020-12-23 10:07:52,419	02,551	Alarm 1
confirmed	AL 002	31.975	2020-12-23 10:07:52,519	02,404	Alarm 2
confirmed	AL 001	23.098	2020-12-23 10:08:10,661	03,306	Alarm 1
confirmed	AL 002	30.308	2020-12-23 10:08:10,761	03,153	Alarm 2
	AL 001	23.043	2020-12-23 10:08:26,445	02,558	Alarm 1
	AL 002	31.739	2020-12-23 10:08:26,598	02,353	Alarm 2

The following actions are available:

- Left click on a row:
  Select alarm message

The toolbar contains the following possible actions:

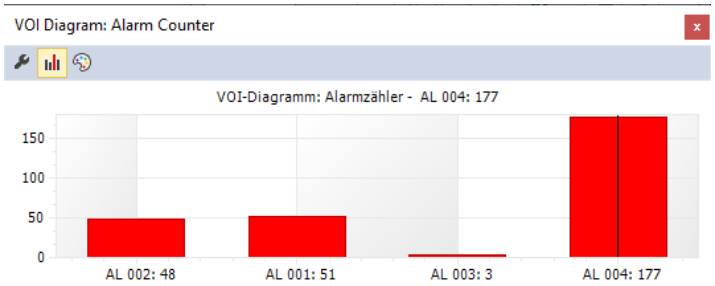
- Delete selected entry
- Delete all entries
- Confirm selected alarm
- Confirm all alarms

Property Pane "VOI Diagram: Alarm Counter"

The Property Pane "VOI Diagram: Alarm Counter" is not contained in the default layout.

If required, it can be opened in menu item **[VIEW > VOI Windows > VOI Diagram: Alarm Counter]** and is then located at the lower side of the program desktop.

The selected Alarm Counter is displayed - see **Alarm Counter** on page **63**.



The value of the alarm counter at cursor position is displayed in the title. Press the Shift key to move the cursor with the mouse.

The toolbar contains the following possible actions:

- Opening a dialog box for selecting alarm counters
- Counter maximum on/off:
  If "Counter Maximum" is activated, the cursor is positioned automatically at maximum value.
  If "Counter Maximum" is deactivated, the cursor may be moved to a particular counter.
- Opening a dialog box for defining the color of the bar charts

Property Pane "VOI: Current Alarm Message"

The Property Pane "VOI: Current Alarm Message" is not contained in the default layout.

If required, it can be opened in menu item **[VIEW > VOI Windows > VOI: Current Alarm Message]** and is then located at the upper side of the program desktop.

The current alarm message is displayed - see **Alarm Messages** on page **62**.

Property Pane "VOI: Alarm Message History"

The Property Pane "VOI: Alarm Message History" is not contained in the default layout.

If required, it can be opened in menu item **[VIEW > VOI Windows > VOI: Alarm Message History]** and is then located at the upper side of the program desktop.

Prerequisite is the use of the alarm data saving in the History (see **History** on page **76**).

If an alarm picture is added to the History, a corresponding message with timestamp and the time elapsed since then is displayed in the property window "VOI: Alarm Message History".

Property Pane "VOI Overview: Values"

The Property Pane "VOI Overview: Values" is not contained in the default layout.

If required, it can be opened in menu item **[VIEW > VOI Windows > VOI Overview: Values]** and is then located at the upper side of the program desktop.

The current value of one or more VOIs is displayed. The display must be activated explicitly for each VOI (check "Show in VOI Overview" in the "Properties: VOI Value" dialog, see **Properties of VOI Values** on page **52**).

Property Pane "Digital Outputs of Camera"

The Property Pane "Digital Outputs of Camera" is not contained in the default layout.

If required, it can be opened in menu item **[VIEW > Digital Outputs of Camera]** and is then located at the upper side of the program desktop.

It shows the current state of both of the camera's digital outputs.

Property Pane "Copy"

It is possible to display a copy of the current image window in an additional property pane. For example this option enables the user to display the contents of the image window on a second screen. It is available for:

- Main Image
- Reference Image
- Difference Image
- Filter Image
- 2D Line Image
- History

The Property Pane "Copy" is not contained in the default layout. If required, it can be opened in menu item **[WINDOW > Copy]** or **[VIEW > Other Windows > Copy]** and is then located on the right side of the program desktop.

Help Functions

Program Diagnostics

The program diagnosis function can be started via the menu item **[HELP> Diagnostics...]**.

The most important information about the state and configuration of **PYROSOFT** is then automatically written to an XML file. In case of a malfunction, this file can provide important information for troubleshooting.

Open Log File

The menu item **[HELP> Open Log File...]** can be used to open the log files generated by **PYROSOFT**. In these files the program state is logged during the program usage.

In case of a malfunction, these files can provide important information for troubleshooting.

Backup and Restore Program Settings

The menu item **[EXTRAS> Save Settings...]** saves all **PYROSOFT** configuration files to a ZIP file.

In case of a new installation of **PYROSOFT**, all settings can thus be easily transferred.

Also in case of a malfunction these files can provide important information for troubleshooting.

The ZIP file created can then be imported again at any time via the menu item **[EXTRAS> Restore Settings...]**.

The **[EXTRAS> Reset Settings]** function resets all settings to their default values.