BENNING

Operating manual

Translation of the German original version

BENNING TC Analyser

5311 / 02/2024 en

Legal notice

Notes concerning the documentation

Ensure that the applicable documentation is used for this product. For safe handling, knowledge that is provided in these instructions is required.

The product may only be handled while following this documentation, particularly the safety instructions and warnings it contains. The personnel must be qualified for the respective task and have the capability to recognise risks and prevent possible dangers.

Manufacturer and holder of rights

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Benning is aware of the importance of language with regard to the gender equality and endeavors to take this into account at all times. To improve readability, we have refrained from consistently using differentiating formulations.

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1 Introduction

The described PC software BENNING TC Analyser (in the following only referred to as “application”) enables the viewing, management, analysis and documentation of thermal images.

Further information

https://tms.benning.de/tc

1.1 General notes

Target group

This operating manual is intended for the following groups of people:

- Professional users, craftspeople and do-it-yourselfers

Required basic knowledge

To understand these operating manual, you will need general knowledge of testing and measuring equipment. Moreover, you will need basic knowledge of the following issues:

- Thermography

Purpose of the operating manual

This operating manual describes the device and provides you information about how to handle it.

Keep this operating manual in a safe place for later use. Read this operating manual before handling the device and follow the instructions.

NOTE

Disclaimer of liability

Please make sure that any person using the device has read and understood the instructions of this operating manual before handling the device and that the instructions are adhered to in all points. Non-observance of this operating manual might result in product damage, property damage and/or personal injury.

Benning assumes no liability for damage and malfunctions resulting from the failure to observe the instructions in this operating manual.

The devices are subject to continuous further development. Benning reserves the right to make changes to the device’s design, configuration and technology. The information in this operating manual corresponds to the state of technical knowledge at the time of printing. For this reason, no claims for certain device characteristics can be derived from the contents of this operating manual.

Information in this operating manual can be changed at any time without prior notice. Benning is not obligated to make amendments to this operating manual or to keep it up to date.

Direct any technical questions to Technical Support [page 7].

Trademarks

All trademarks used are the property of their respective owners, even if they are not separately marked as such.

1.2 History

Release number	Amendments
02/2024	• Initial release

Table 1: History

1.3 Service & support

Please contact your specialty retailer or the BENNING Service Center for any repair or service work that might be required.

Technical Support

Please contact our Technical support for technical questions on handling the device.

Phone:	+49 2871 93-555
Fax:	+49 2871 93-6555
E-Mail:	helpdesk@benning.de
Internet:	www.benning.de

Returns management

Easily and conveniently use the BENNING returns portal for a quick and smooth returns processing:

https://www.benning.de/service-de/retourenabwicklung.html

Phone:	+49 2871 93-554
E-Mail:	returns@benning.de

Return address

BENNING Elektrotechnik und Elektronik GmbH & Co. KG

Retourenmanagement

Robert-Bosch-Str. 20

D - 46397 Bocholt

2 Safety

2.1 Intended use

Only use the device within the framework of the corresponding technical data. Any operating conditions that deviate from this shall be considered as improper use. Solely the user of the device shall be liable for any resulting damage.

Please note the following:

- In case of improper use, the liability and warranty claims become void. Solely the user of the device shall be liable for any damage resulting from improper use. Uses not complying with the intended use include e. g.:
  - Use of components, accessories, spare or replacement parts that have not been released and approved for the respective application by Benning
  - Non-observance, manipulation, changes or misuse of the operating manual or the instructions and notes contained therein
  - Any form of misuse of the device
  - Any use other than or beyond that described in this operating manual
- Warranty and liability claims are generally excluded if the damage is the result of force majeure.
- If any prescribed services are not performed regularly or not on time, according to the manufacturer's specifications during the warranty period, a decision about a warranty claim can only be made once the findings are available.

Direct any questions to Technical Support [▸ page 7].

3 Getting started

3.1 System requirements

Operating system:

- Microsoft Windows 7 / Windows 8.1 / Windows 10 (32-bit/64-bit)
- Windows SP3 (32-bit)
- Windows Server (64-bit)

CPU:

- i5-4590 or higher

RAM:

- 4G or higher

Graphics board:

- RADEON X700 series 256M or higher

3.2 Installing the application

Procedure

1. Install the downloaded “BENNING TC Analyser” application on your PC.
2. You can carry out the installation as a “Quick Install” at “C:\Program Files (x86)\Benning\TC Analyser” or as an customised installation (“Custom Install”) using a customised installation path.
3. You can select to create a desktop icon.
4. Start the application.
5. When the application is started for the first time, a dialogue window opens for entering the file path for “My Favorites”. Enter the library name and the file location.

   The following is recommended:
   Storage path other than the C drive or the desktop. The folder for saving the files must be empty.

   The folder already contains some sample images.

Update

Install the new version of the “BENNING TC Analyser” application on your PC. During the installation process, click “Upgrade” to install the new version. The application will be installed at the storage location of the previous version.

Uninstalling the application

Navigate to the application via the Windows© Start menu and right-click the application. Select the “Uninstall” option to call the Windows© function “Uninstall or Change a Program” and uninstall the application.

3.3 Settings

You will find the settings in the top right of the title bar. You can open the “Settings” via the gear icon to make the following settings:

Setting	Function
Location	You can specify the storage path for “My Favorites”.
Overlay	You can edit, enable and disable the displaying of temperature and image information.
Language	You can choose between German and English as the display language. Changing the language requires restarting the application subsequently.
Measurement	You can set the following units: • Temperature unit: °C, °F or K • Distance unit: Metric or Imperial • Area unit: mm^2, m^2, ft^2 • Select Temperature Range for Level & Span
Import Mode	You can specify the import mode for images. Here you can select whether you want to copy (Copy), move (Cut) or link (Index) from the source folder to your “My Favorites” folder.
About	Information about the installed software version.

Table 2: Settings

4 Application overview

Various function pages are available for managing, analysing and documenting your image data.

- Library
- Analysis
- Report

After starting the application, the “Library” function page for managing the captured images opens automatically.

- To call another function page, click the corresponding tab at the top of the screen.

The graphic describes the basic procedure from importing your files to exporting the reports:

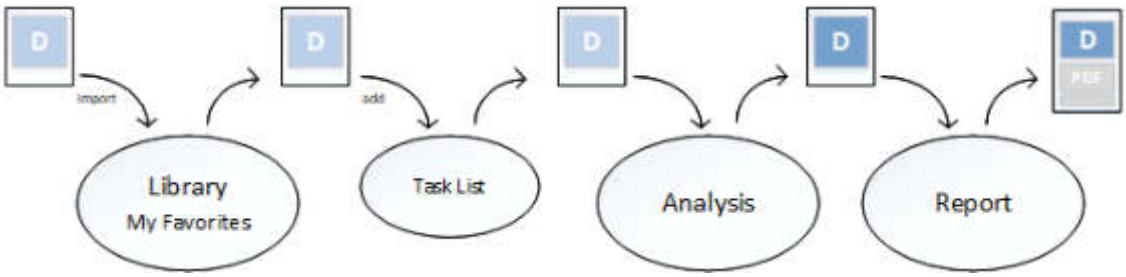


Figure 1: Basic procedure

However, you can also skip steps. For example, you can transfer images from the library directly to the function for creating reports [page 22].

5 Library

The “Library”function page is intended to manage available and imported images.

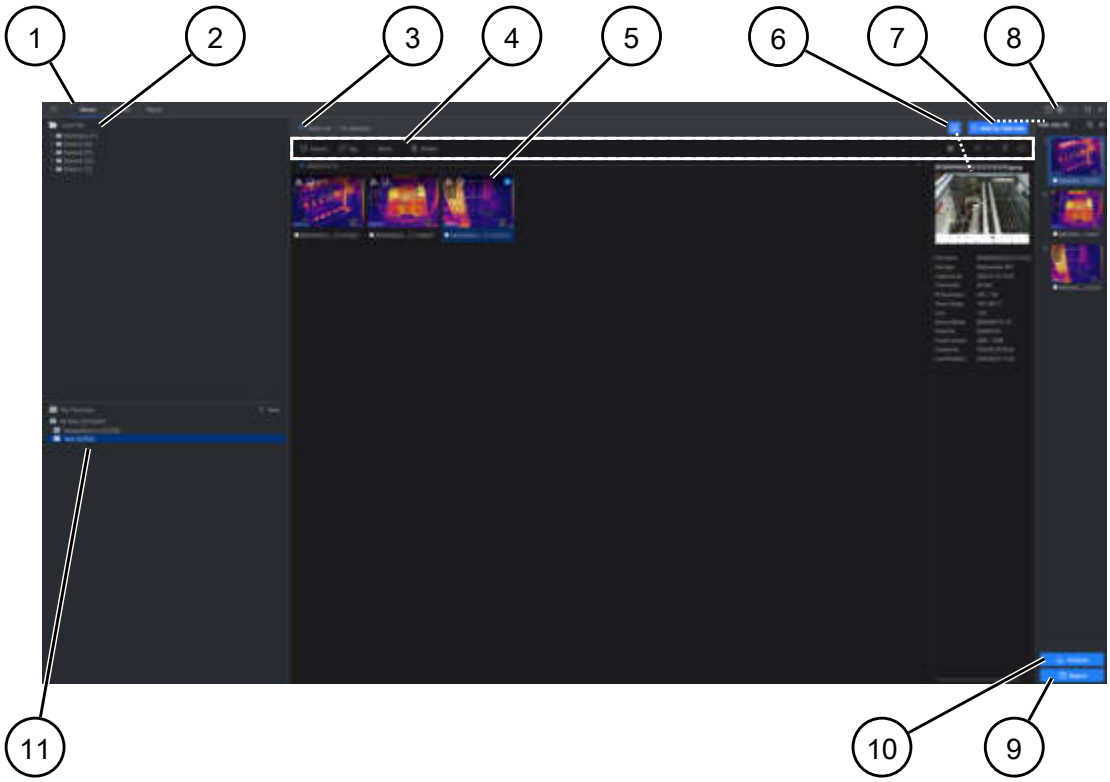


Figure 2: “Library” function page

1	“Library”	Opens the “Library” function page.
2	Local File	Displays the local folders containing images. You can view all files and import them to “My Favorites” [▷ page 13].
3	“Select All”	Selects all files in the view (5). / Cancels the selection.
4	Toolbar	Contains all functions for managing the images [▷ page 14].
5	View	Displays the images of the selected folder.
6	View Image Info	Opens the pane showing the image data. Here, all information about the selected image is displayed.
7	“Add to Task List” Task List	If you want to analyse images, add them to the task list. You can add single, multiple or all files of a folder to the task list [▷ page 16].
8	Settings	“Settings” menu [▷ page 10]
9	“Report”	Transfers the images from the task list to the function for creating reports.
10	“Analyze”	Transfers the images from the task list to the analysis function.
11	“My Favorites”	Displays the folders under “My Favorites”. You can manage your images under “My Favorites”.

5.1 Managing “My Favorites”

All imported files are saved and managed centrally under “My Favorites”.

Creating folders under “My Favorites”

We recommend creating a folder structure under “My Favorites” before importing.

In the “My Favorites” pane, click the “+ New” button to create a new folder.

- Under “My Favorites”, a maximum of 32 folders can be created.
- A maximum of 350 files can be imported into a folder under “My Favorites”.
- Under “My Favorites”, a maximum of 10,240 files can be imported.
- The numbers in brackets indicate the number of files already added / the maximum number of files.
- A folder with sample thermal images is already available.

Under “My Favorites”, right-click a folder to open the context menu. The following functions are available:

Menu item	Meaning and function
“All Files” → Show details	Show details (creation date, last editing, capacity, etc.)
Move to	Move to another folder.
Copy to	Copy to another folder.
Add All to Task List	Add the entire folder to the task list for further editing during analysis or when creating reports.
Analyze All	Opens the images for further editing on the “Analysis” function page.
Generate Report for All	Opens the “Report” function page, prompts you to select the desired template and inserts the images automatically.
Rename	Renaming folders under “My Favorites”.
Delete	Deleting folders under “My Favorites”.
Show in Folder	Opens the storage location of the file.

Table 3: Context menu of folders under “My Favorites”

5.2 Importing files

The following two procedures are available for importing files:

Procedure no. 1

1. Open the “Library” function page.
2. Select a folder under “My Favorites” and click the “Import” button in the toolbar.
3. If you have not yet selected the import mode, you will now be prompted to do so. Select the import mode and confirm with “OK”.

   Your file explorer opens.
4. Select the desired files and confirm with “Open”.

Procedure no. 2

1. Open the “Library” function page.
2. In the “Local File” pane, select the files to be imported.
3. Right-click the folder or image and select “Import to Favorites”.
4. If you have not yet selected the import mode, you will now be prompted to do so. Select the import mode and confirm with “OK”.
5. Select the desired target folder from the folders listed under “My Favorites”.

5.3 Managing files

In the library, several menus are available for managing your images.

Library – Toolbar

In the toolbar, the following functions are available:

Symbol	Designation	Function
	Import	If you have opened a local folder in the “Local Files” pane and clicked an image in the page view, you can use this import function to import images to “My Favorites”. To do this, select one of the three import modes displayed.
	Tag	You can add a coloured tag to the images.
	More	• Move to • Copy to • Rename
	Delete	

Table 4: Library toolbar

If the functions are greyed out, click an image in the view.

Library – Context menu

If you right-click an image in the view, the following functions are available in the context menu:

Menu item	Meaning and function
Move to	Moves images to another folder.
Copy to	Copies images to another folder.
Add to Task List	Adds the image to the task list. For further editing in the analysis or for creating a report.
Analyze	Opens the image for further editing on the “Analysis” function page.
Generate Report	Opens the “Report” function page, calls the template and inserts the image automatically.
Delete	Deletes the image.
Reset Tag	Removes a coloured tag from the image.
Rename	Enables the renaming of the image.
Show in Folder	Opens the file location.

Table 5: Library context menu for image

Grouping, sorting and filtering files

You can group, sort and filter your images in the view using various criteria. To do this, the following functions are available in the toolbar:

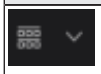
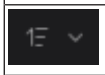
Symbol	Designation	Meaning and function
	Group	You can group your files by the creation date or the coloured tag.
	Sorting	You can sort your files by the creation date, the coloured tag or the file name.
	Filter	You can filter your files using the following parameters: • Time Range (start and end date) • File Name • Tag • Text Annotation • Device Model To enable the filter, click “Filter”. If a filter is enabled, the filter symbol is highlighted in blue. To delete the filter, open the filter function and click “Reset”.
	Refresh	Refreshes the view.

Table 6: Library toolbar

5.4 Adding images to the task list

The task list is displayed on all function pages (“Library”, “Analysis” and “Report”). To select images for further editing, add them to the task list. To do this, use one of the following three options:

- To add a **single image**, double-click the image in the view.
- To add **several images**, click a folder under “My Favorites”, select the desired images in the view and click the “Add to Task List” button in the top right of the function bar.
- To add **all images** of a folder under “My Favorites”, right-click the respective folder and select “Add All toTask List” from the context menu.

6 Analysis

The “Analyse” function page is intended to analyse and edit your images.

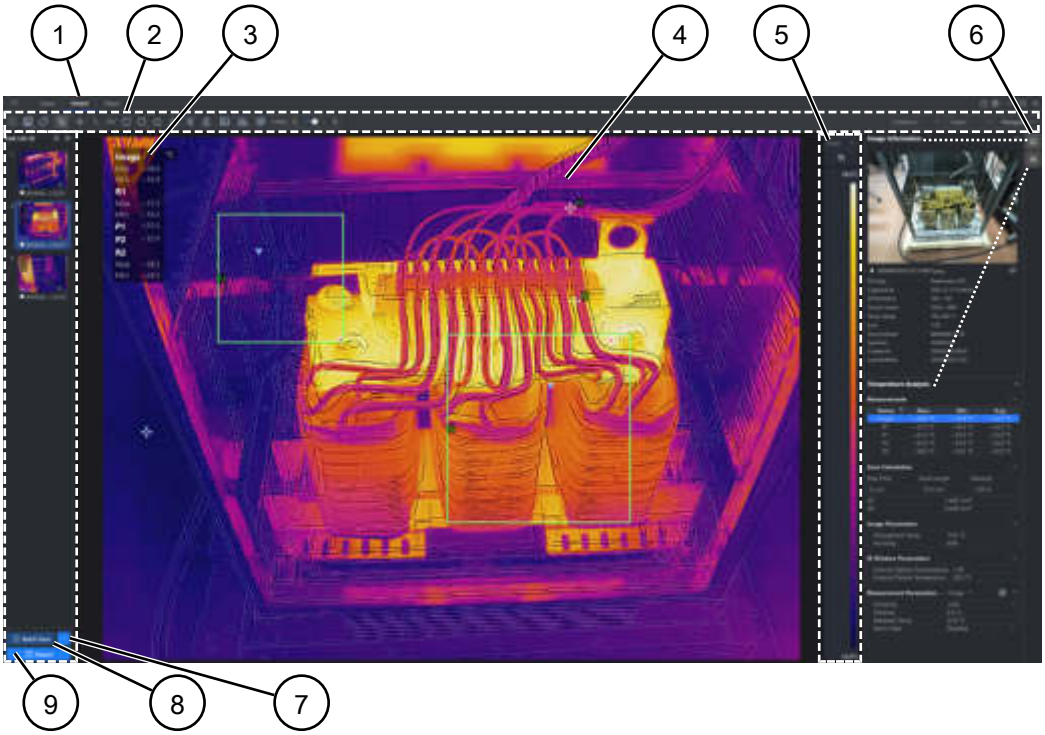


Figure 3: “Analysis” function page

1	“Analysis”	Opens the “Analysis” function page.
2	Toolbar	Shows all analysis tools and settings [page 18].
3	Overlay	Displays the temperature information of individual measurements.
4	View	Image view for editing and analysis.
5	Temperature Scale	Displays the temperature distribution of the image. You can select the temperature range automatically and manually. You can also reverse the temperature scale using the symbol.
6	“Image Information” and “Temperature Analysis”	Opens the “Image Information“ and “Temperature Analysis“ panes. In the “Image Information” pane, all information about the image is displayed. You can add notes using the symbol. In the “Temperature Analysis” pane, all temperature-relevant information is displayed in an editable form [page 19].
7	“Batch Save As”	Saves the image files from the task list in the desired folder.
8	Batch Save	Saves the image files from the task list in the source folder.
9	Report	Transfers the image files from the task list to the “Report” function page.

6.1 Operating analysis tools

In the “Analysis” toolbar, the following functions are available:

Symbol	Designation	Function and operation
	Save	• Save (overwrite the original)
	Drop-down menu “Save”	• Save as (create a copy) • Export the temperature matrix (as CSV file) • Export files (exported files cannot be reused for image analysis)
	Tag	You can add coloured tags to files. Select images, click the “Tag” symbol and select a colour.
	Arrow Tool	With the arrow tool you can **move** temperature measuring points and shapes. You can use the squares on the shapes to subsequently adjust and **scale** the measuring shapes.
	Add measuring point (“Spot”)	You can determine the temperature information in certain areas or spots of the image. The temperature information is saved in the image file and is available for creating the thermography report. You can also show the temperature information in the image. You will find the setting option for showing the temperature information in the “Settings” [page 10] or in the “Analysis” toolbar under “Overlay settings”. To add a **temperature measuring point**, select the corresponding function. Click the image at the desired position. To add a **temperature measurement shape**, select the corresponding function. Click into the image and drag the shape. For a polygon, draw the shape using up to 10 individual lines and finish the process with a right-click.
	Temperature measuring shapes	
	Delta	Opens the “Set Delta Calculation” window. You can determine the temperature difference between any two temperature points.
	Delete Tool	Removes individual measurements. Select the function and then click the measurement. Another option: Right-click the measurement → “Delete Measurement”
	Remove All Measurements	**Removes all measurements** in the image. Another option: Right-click the image → “Remove All Measurements”
	Overlay Settings	You can set, show and hide the display of measured temperature values shown at the top left of the image. This can also be set in the Settings [page 10].
	Chart	You can display the temperature distribution in the image or that of a measurement in the form of a bar chart. Select the measuring function. Click the image or the measurement to display the temperature distribution as a chart. If you click the chart, the temperature distribution will be displayed as a percentage.
	Rotate	You can rotate the image in steps of 90°.

Symbol	Designation	Function and operation
	Zoom	You can operate the zoom function in the view using the symbol as well as using the “ctrl” key and the scroll wheel of your mouse.

Table 7: “Analysis” toolbar

Editing an image

The following setting options for editing images are available in the top right of the toolbar:

Setting	
Palettes	You can choose between different colour palettes for displaying your images.
Image Mode	Thermal: Only the thermal image is displayed. Fusion: A combination of the thermal and visual images is displayed. PIP: The thermal image is displayed in the center of the visual image. Visual: Only the visual image is displayed. Blending: A blending of the thermal and visual images is displayed.
Temperature Scale	You can determine the colour scheme of the colour scale (Histogram or Linear).

Table 8: Editing an image

Configuration of measurement attributes

To better analyse the images, you can configure the applied measurements in the “Temperature Analysis” [page 17] pane.

Measuring results	Meaning and function
Measurements	Displays the temperature ranges for the entire image file and all measured temperature values.
Delta	Displays the delta calculations that have been set. The result of the delta calculation can be displayed in colour using the colour scale. To do this, specify three temperature values. E. g. green area (normal temperature) blue area (increased temperature) yellow area (maintenance after interruption of operation) red area (immediate maintenance with interruption of operation).
Area Calculation	Displays the area calculation of the temperature measuring shapes used. You can set the following values: • Pixel Pitch • Focal Length • Distance

Image Parameters	Displays the image parameters that have been set. You can set the following values: • Atmospheric Temp. • Humidity
IR Window Parameters	Displays the IR parameters that have been set. You can set the following values: • External Optical Transmittance • External Optical Temperature
Measurement Parameters	Displays the measurement parameters that have been set for the image or for individual measuring points. First, select the corresponding measuring point or image from the drop-down menu. You can then set the following measurement parameters: • Emissivity of the measuring object • Distance to the measuring object • Reflected Temp. • Atmospheric Temp. • Alarm Type Each measuring tool can be provided with a temperature alarm. If a measured value is outside the set alarm thresholds, the tool and the measuring result will be displayed in red. You can enable and disable the temperature alarm. Select the threshold value when enabling the alarm. If you select “Image” in the “Measurement Parameters” and click on the symbol, the settings will be applied to all measuring tools in the image. You can also set the “Measurement Parameters” and “Global Measurement Attribute” options via the context menu [▷ page 20].

Table 9: “Temperature Analysis” pane

Transferring measurement attributes

To analyse several images simultaneously, you can easily transfer measuring tools and settings applied to one image to the other images of the task list.

To do this, right-click the image in the task list in which the measuring tools have been applied and select “Apply Measurements to All” or “Apply Image Settings to All”.

Setting measurement attributes via context menus

If you right-click an image, the following menu items will be available:

- Global Measurement Attribute (measurement attributes for the entire image)
- Delete All Measurements

If you right-click a measurement, the following menu items will be available:

- Delete Measurement
- Measurement Attribute
- Regional Image Enhancement
- Export Temp. Matrix

7 Report

The “Report” function page is intended to document the thermography data. You can document all images of the task list using predefined or self-created report templates and export them as ODT or PDF documents. Reports in ODT format can be subsequently edited in a word processing programme such as MS Word®.

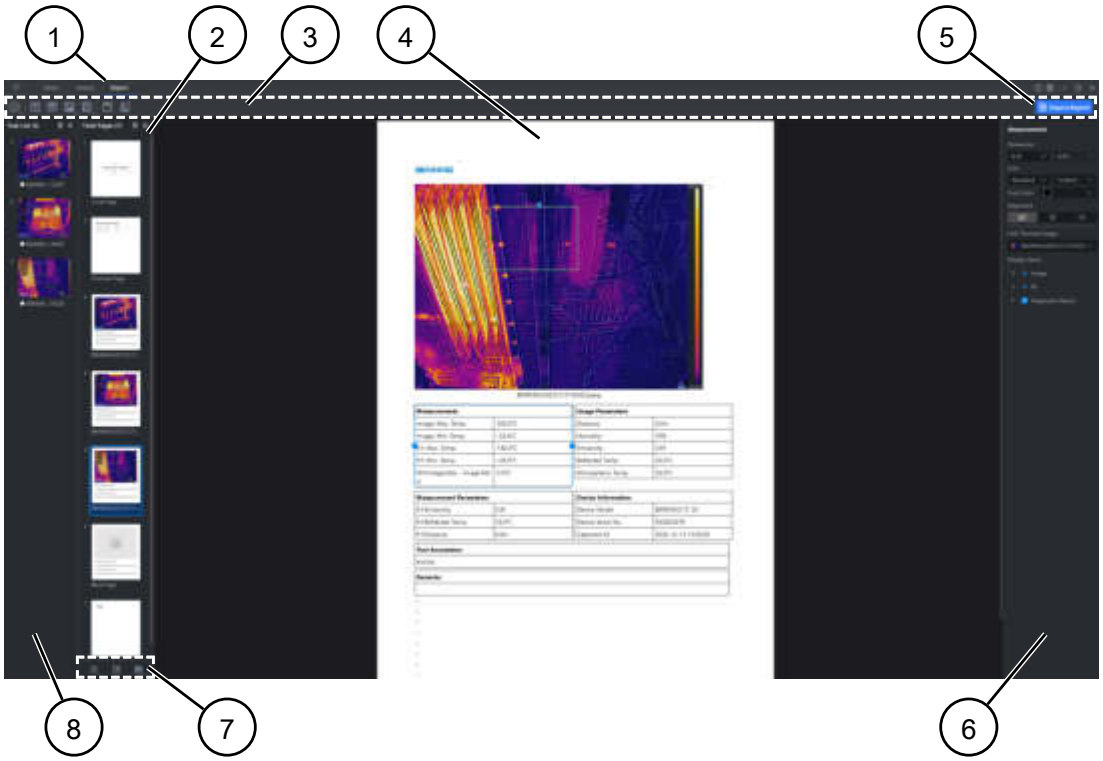


Figure 4: “Report” function page

1	“Report”	Opens the “Report” function page.
2	“Total Pages” pane	Page preview / navigation [▷ page 22] You can drag your images from the task list into this pane to start creating your report.
3	Toolbar	Contains the tools for creating and editing report templates.
4	View	Page view for editing the report
5	“Export Report”	Starts the export of reports in ODT or PDF format.
6	Formatting pane	Displays the formatting of individual elements (table, image, etc.). You can click an element in the report to display formatting options.
7	“Total Pages” toolbar [▷ page 22]	Here, the following functions are available [▷ page 22]: • Add page • Delete page • Templates
8	“Task List” pane [▷ page 16]	Here, you can add all images for creating a report [▷ page 16].

7.1 Creating a report

The following functions are available to create a report:

Procedure – Creating a report without prior analysis

1. In the “Library”, right-click a folder under “My Favorites” or images and select “Generate Report”.
2. In the “Select Template” window that appears, select the desired template configuration and confirm with “OK” to generate the report.

Requirements

- You have stored images in the task list [page 16].

Procedure – Creating a report for analysed images

1. You can start creating reports from all function pages. To do this, click the “Report” button in the task list.
2. In the “Select Template” window that appears, select the desired template configuration.

   or

   Click the symbol and select one of the following options:

- Select Existing Template
  Drag the images from the task list to the “Total Pages” pane or click “Add All Images”.
- Batch Process & Export
  Select a report template and click “OK”. The report is prepared for export and can no longer be edited. The images are automatically added to each page.
- Create Blank Report
  Creates a blank page in the “Total Pages” pane. Customise the report according to your needs [page 22].

7.2 Configuring a report

You can use the following editing functions in your report. To start creating a report, drag the desired image(s) from the task list to the “Total Pages” pane and select a report template.

In the “Total Pages” pane, the following editing functions are available:

Symbol	Designation	Functions
	New Page	Add new page
	Delete page	Delete selected page
	Change Template For All Content Pages	For the selected page, you can select from existing templates or import a template via the symbol (*.ART format).

Table 10: Toolbar „Total Pages“

The following editing functions are available in the toolbar:

If some of the functions are greyed out, click an element (image, table, etc.) in the view (page preview).

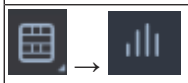
Symbol	Designation	Functions
	Header	Configurate header
	Text	Add text field
	Table	Add table
	Image → Thermal	Add thermal image
	Image → Visual	Add visual image
	Image → Logo	Add logo
	Predefined Object → Information	Add information ● Image Information ● Device Information ● Environment Information ● Text Annotation
	Predefined Object → Temperature Measurement	Add measured temperature values ● Measurements ● Image Parameters ● Measurement Parameters ● Delta (max. one delta object per page)
	Predefined Object → Temp. Distribution Chart	Add temperature distribution chart ● Temp. Distribution Bar Chart ● Temp. Distribution Line Chart

Table 11: “Report” toolbar

Editing report pages

- You can **insert** and **move** elements (text, image, table, etc.).

  The light blue tag indicates the **insertion position**. Use the “Enter” key to generate breaks and thus further insertion positions.
- By clicking an element, you can adjust its **size** using the light blue squares on the frame.
- You can use the “Del” key to **delete** elements.
- To insert an **image** into an image element, double-click the image element. You can select the corresponding image in the displayed explorer.

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