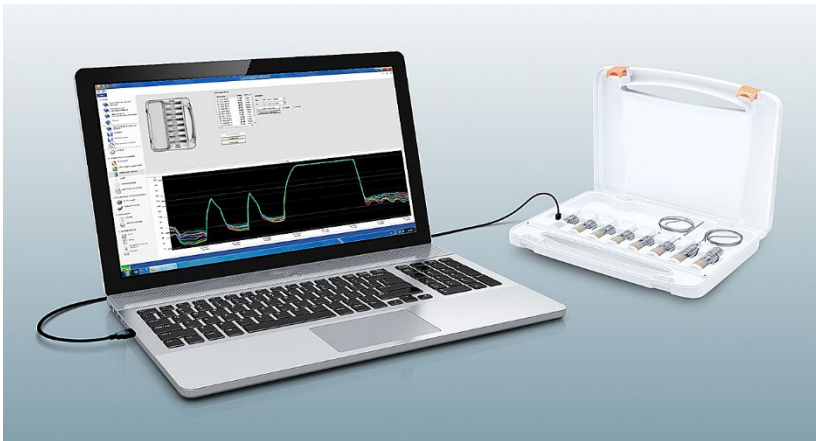




testo 191 professional software

Instruction manual



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1 Safety and disposal

1.1 About this document

- The instruction manual is an integral part of the instrument.
- Keep this documentation to hand so that you can refer to it when necessary.
- Always use the complete original instruction manual.
- Please read this instruction manual through carefully and familiarize yourself with the product before putting it to use.
- Hand this instruction manual on to any subsequent users of the product.
- Pay particular attention to the safety instructions and warning advice in order to prevent injury and damage to the product.



Knowledge of Windows® operating systems is required to work with the software.

1.2 Symbols

Display	Explanation
	Note: basic or further information
1 2 ...	Action: several steps, the sequence must be followed
>	Action: one step or optional step
▶	Result of an action
✓	Requirement
Menu	Elements of the program interface
[OK]	Buttons of the program interface

2 Specifications

2.1 Intended purpose

The testo 191 Professional software is used for programming, reading out and evaluating testo 191 data loggers. The data loggers are programmed with the testo 191 Professional software via the programming and readout unit, and they then measure independently. Once the measurement has been carried out, the measurement data collected is stored temporarily in the internal memory of the data logger. The measurement data is then transferred to the PC via USB cable using the programming and readout unit.

The measurement data is released for further processing steps following the readout process in the testo 191 Professional software. Calculations can then be carried out and acceptance criteria defined, enabling you to determine whether the measurement was successful at a glance. The measurement data can be examined very closely using various data analysis options. The prepared measurement data can be presented clearly and in full in a report.

2.2 System requirements

Operating system

The software was designed for the following 32 and 64 bit operating systems:

- Windows® 7 (except HOME Edition)
- Windows® 8 Pro, Windows® 8 Enterprise
- Windows® 8.1
- Windows® 10

Hardware

To ensure smooth communication between the programming and readout unit and the PC software, the following requirements must also be met:

- Interface USB 2.0 or higher
- Internet Explorer 9 or higher




For reporting, date and time settings are automatically transferred from the PC. The administrator must make sure that the system time is regularly compared with a reliable time source and adjusted if necessary, to ensure the authenticity of the measurement data.

3 First steps

3.1 Running the installation

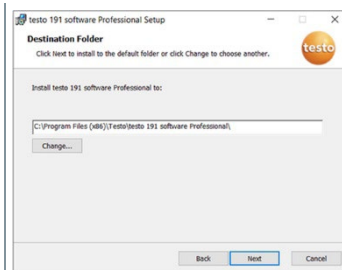


To install the PC software, you need administrator rights for the PC you are using.

- 1 Insert the installation CD for the testo 191 Professional software in your computer.
 - 2 Double-click to open the file  Setup.
- ▶ The setup window opens.



- 3 Follow the setup instructions.
- 4 If necessary, change the destination folder in which the software is to be saved.



4 Using the testo 191 Professional software

4.1 Start screen

The start screen of the testo 191 Professional software appears automatically once the software program is opened. From here, the system settings can be adjusted, the status display can be read and process templates can be selected.

1	System settings	2	Process templates
3	Status display		

4.2 Info

Under Info, recently used data can be called up again.

1	Recent files: recently used data is displayed.	
---	--	--



To get back to the start screen from the **Info** system settings, click the **Info** field again. The field is located in the top left corner of the screen.

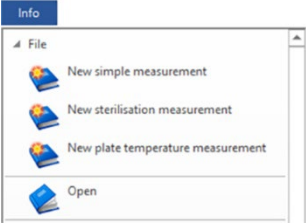
4.3 Status display

The status display informs you whether the programming and readout unit is successfully connected to the PC.

<p>1 Status display lights up green: the programming and readout unit is successfully connected to the software.</p>	
<p>2 Status display lights up black: the programming and readout unit is not connected to the software.</p>	


















4.4 Process templates

The process templates provide you with templates for intuitive and user-friendly programming, reading and evaluation of the testo 191 data loggers. There are templates for Simple qualification, Sterilisation/pasteurisation measurement and New plate temperature qualification. Saved .vi2 files can also be opened.

<p>1 Start measurement process: click to open the appropriate/required process template.</p>	
<p>2 Open: click to open existing .vi2 files in the software.</p>	

4.5 Contents of the process templates

The contents open automatically once you have clicked on a process template. You can now click on the icons step by step to complete the process. The contents of the process templates depend on the selected process and can therefore vary in terms of their scope.

Element	Designation
	Units
	Save
	Save as
	Export to Excel
	Battery check
	Programming of loggers
	Readout of loggers
	Chart
	Raw data view
	Calculations
	Acceptance criteria
	Test results
	Statistics
	Content
	System
	Adjust meas. point positions
	Create report

4.5.1 Units

Set the units of temperature and pressure that you need.



The programming and readout unit does not need to be connected in order to set the units.

- 1 | Click on one of the three process templates.
 - 2 | Click on **Units**.
 - 3 | Select units for temperature and pressure.
- ▶ | The defined temperature and pressure units are automatically saved.



Once the data loggers have been read, the units for the current file can no longer be changed.

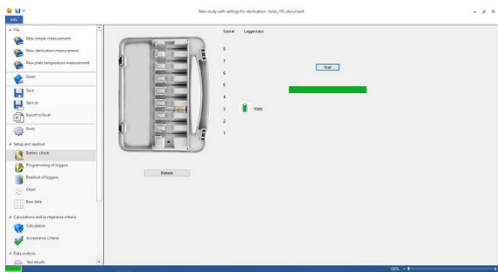
4.5.2 Battery check

Under **Battery check**, you can quickly and easily determine the battery status of the data loggers placed in the programming and readout unit.

- ✓ For a battery check to be carried out, the programming and readout unit must be connected to the PC via the USB cable supplied, and the data loggers placed in it.
- ✓ Make sure you have used the correct distance adapters.



For the testo 191 T1, testo 191 T2 and testo 191 T3 data loggers, you need the long distance adapter. For the testo 191 T4 data logger, you need a short distance adapter. The testo 191 P1 data logger does not require a distance adapter.









<p>1 The data loggers positioned there are displayed.</p>	
<p>2 Start: start of battery status measurement.</p>	
<p>3 Battery check: checking of the battery status of the data loggers is automatically started and displayed.</p>	
<p>4 Refresh: click on “Refresh” if the arrangement of the data loggers in the diagram above does not match the arrangement of the data loggers in the programming and readout unit</p>	



During the battery check, existing measurement data from previous and current files is deleted for all data loggers placed in the readout unit.

4.5.3 Programming of loggers

Under **Programming of loggers**, you can prepare the data loggers for a measurement. You can define start and stop conditions and manage calibration data.

Element	Designation
	Data logger could not be programmed.
	Data logger successfully programmed.
	Data loggers can now be programmed.
	Battery needs replacing.
	Battery will soon need replacing.
	Battery is working properly.
	Data logger has reached its maximum service life. Replace data logger.
	Battery has been replaced.

- 1 Place the data loggers in the programming and readout unit and connect this to the PC using the USB cable supplied.

- ▶ The data loggers positioned in the programming and readout unit appear in the software and display the symbols (wheel with red arrow) and battery status.



- 2 Click on **Programming** for the required socket.
 - ▶ The data logger in this socket can be programmed



The socket, data logger type, serial number and version number appear on the top right of the screen.

- 3 Define the start conditions, the cycle and the stop conditions.

Start conditions:

Here you can choose between a measurement start as a function of date/time, a temperature or pressure overrange as well as a temperature or pressure underrange.

Cycle:

The cycle can be defined from one second (00:00:01) up to 24 hours (23:59:59).

Stop conditions:


Here you can choose between a measurement stop as a function of date/time, the defined number of readings or the maximum memory size.

4 Click on **Apply current**.


▶ The settings for this data logger will be applied.

If you want to program all data loggers located in the programming and readout unit with these settings, click on **Apply to all**.



If programming was successful, the symbol  appears and the settings appear in the box at bottom left with the heading **List of loggers already programmed for this measurement**.



If the battery status is , the battery needs replacing. To change the battery, please refer to the instruction manual for the testo 190 data logger for temperature and pressure.

Interruption of the supply voltage is detected by the software and a query to reset the battery voltage counter is started. Important: Start condition must be at least 3 minutes in the future.

4.5.3.1 Name data logger

You have the option of naming each data logger individually.

1 Click on **Programming** for the required data logger.

▶ **Logger name** opens.

Serial number	name
8186 9892	LOG1
8186 9898	LOG2
8186 9831	LOG5

2 Enter the required name.



Input is limited to 20 characters.
Invalid characters: / \ : !

3 Click on **Apply current**.



You can enter the name directly for all data loggers which are in the readout unit. If you then click on **Apply to all**, the setting is applied as defined by you.

- ▶ The process is completed.

4.5.3.2 Managing calibration data

You can program the calibration data on the data loggers. The calibration data must be carried out individually for each data logger in the programming and readout unit.



The calibration data is saved on the data logger and can be appended to the report.

- 1 Click on **Settings** for the required socket.
- 2 Click on **Calibration data**.
- 3 Enter the **Certificate ID**, **Calibration date** and **Next calibration**.

Calibration settings

Probe 6142 0482 1

Certificate ID

Calibration date 1/ 1/2016

Next calibration 1/ 1/2016

Activate reminder

OK Cancel



You can activate a reminder by ticking **Activate reminder**. The reminder is implemented in the software.

- 4 Click on **Apply current**.
- ▶ The process is closed.

4.5.4 Readout of loggers

Under **Readout of loggers**, you can read the data loggers used and prepare them for the upcoming evaluation. In addition, the required time range can be defined precisely to the second.

Element	Designation
	Data from a different study.
	Data logger ready for readout.
	Data logger readout was successful.

- 1 Place the data loggers in the programming and readout unit and connect this to the PC using the USB cable supplied.

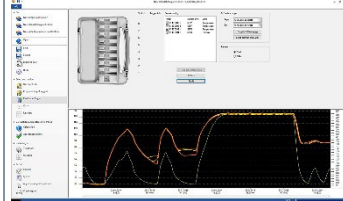
⚠ CAUTION

Risk of burns!

Hot data loggers!

- Allow the data loggers to cool down to at least 50 °C.

- ▶ The data loggers positioned in the programming and readout unit appear in the software and display the battery status.



- 2 Click on **Read out logger memory**.

- ▶ The data loggers placed in the programming and readout unit are read.



If readout is successful, the data loggers appear in the **Current readings** list.

- 3 Put a check mark next to the data loggers that you need for the subsequent evaluation.
- 4 Define the time period for the subsequent evaluation.



Set the points for the **Chart** or **Table** to see the selected time range.

- 5 Click on **Finish**.

- ▶ The measurement data established for the subsequent evaluations is recorded.

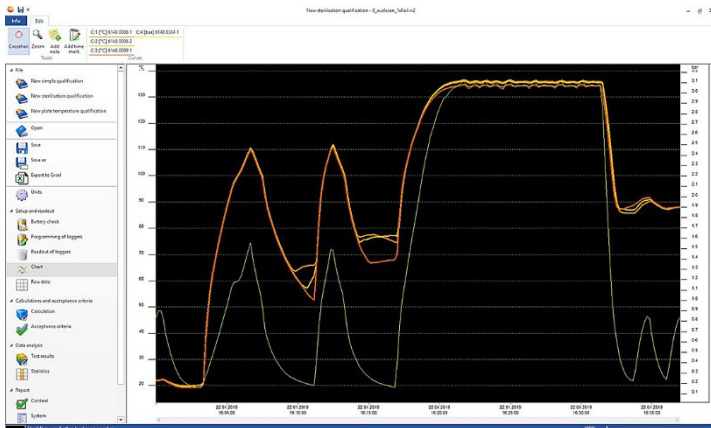
4.5.4.1 Selecting the data loggers and the time range

To limit the subsequent evaluation to the readings that are actually required, here you can define the required data loggers and the required time range.

<div style="border: 1px solid gray; padding: 5px;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">Current readings</th> </tr> <tr> <th>Index</th> <th>number of v...</th> <th>Units</th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/> 6148 0006 1</td> <td>6997</td> <td>Temperature</td> </tr> <tr> <td><input checked="" type="checkbox"/> 6148 0006 2</td> <td>6997</td> <td>Temperature</td> </tr> <tr> <td><input checked="" type="checkbox"/> 6148 0099 1</td> <td>6975</td> <td>Temperature</td> </tr> <tr> <td><input checked="" type="checkbox"/> 6148 0304 1</td> <td>6994</td> <td>Pressure</td> </tr> </tbody> </table> </div>		Current readings			Index	number of v...	Units	<input checked="" type="checkbox"/> 6148 0006 1	6997	Temperature	<input checked="" type="checkbox"/> 6148 0006 2	6997	Temperature	<input checked="" type="checkbox"/> 6148 0099 1	6975	Temperature	<input checked="" type="checkbox"/> 6148 0304 1	6994	Pressure
Current readings																			
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<input checked="" type="checkbox"/> 6148 0099 1	6975	Temperature																	
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<div style="border: 1px solid gray; padding: 5px;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Define time range</th> </tr> </thead> <tbody> <tr> <td>From</td> <td>1/22/2019 4:00:00 PM</td> </tr> <tr> <td>To</td> <td>1/23/2019 11:26:00 AM</td> </tr> <tr> <td colspan="2" style="text-align: center;"> <input type="button" value="Reset to full time range"/> </td> </tr> <tr> <td colspan="2" style="text-align: center;"> <input type="button" value="Set to common time range"/> </td> </tr> <tr> <td colspan="2">Preview</td> </tr> <tr> <td colspan="2"> <input checked="" type="radio"/> Chart <input type="radio"/> Table </td> </tr> </tbody> </table> </div>		Define time range		From	1/22/2019 4:00:00 PM	To	1/23/2019 11:26:00 AM	<input type="button" value="Reset to full time range"/>		<input type="button" value="Set to common time range"/>		Preview		<input checked="" type="radio"/> Chart <input type="radio"/> Table					
Define time range																			
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<input type="button" value="Set to common time range"/>																			
Preview																			
<input checked="" type="radio"/> Chart <input type="radio"/> Table																			
1	Place a check mark to determine whether data loggers are used for the subsequent evaluation or not.																		
2	The start and end will be defined for the required time range.																		

4.5.5 Chart

The chart appears automatically once you have read the data loggers. Here you can quickly and easily analyze the determined readings using crosshairs or a zoom function. Time markers or simple notes can also be inserted here.





Tools, axes configuration, formula and curves are available for analyzing the measurement curves:

Tools:

- Crosshair** : The crosshairs are used for displaying individual measuring points. Enable function: Hold the left mouse button down and drag the mouse over the required area of the curve. The values of the curve at that point are shown in a small separate display window.
- Zoom** : Enable function: Hold the left mouse button down and drag over the required time period of the curve. An enlarged view of this section is

displayed. To return to 100% visibility within the graph, the user can click on the percentage symbol (%) on the right-hand side below the chart. The user can also increase or decrease the visibility by clicking on the (-) and (+) symbols on the right-hand side below the chart.

- **Add note** : Opens an input window -> input note -> **OK**. The input window is closed, a speech bubble is displayed in the curve, which can be dragged to the required position using the crosshairs selection function.
- **Add time mark** : Opens an input window -> input comments -> **OK**. The input window is closed, a green line is displayed in the curve. Right-click on the whole line to remove or edit the time marker. To move the time marker manually, click on the time marker in the chart with the left mouse button and keep it pressed. Position the time marker at the required place and release the mouse button.



Notes can be edited or deleted by right-clicking on the speech bubble. Time markers can be edited or deleted by right-clicking on the line.



The inserted time markers can be used to manually determine the holding phases. Alternatively, you can mark and label important areas on the chart.

Axes configuration:

- **Temperature axis**: automatically opens another window. Remove the check mark for **Automatic scale** in order to customize the range of values. The division of the range of values can also be changed from automatic to manual. This allows you to customize the scaling. To complete the process, click on **OK**.
- **Pressure axis**: automatically opens another window. Remove the check mark for **Automatic scale** in order to customize the range of values. The division of the range of values can also be changed from automatic to manual. This allows you to customize the scaling. To complete the process, click on **OK**.
- **Time axis**: automatically opens another window. Click on **Position** to display an individual time range on the chart. The division of the range of values can also be changed from automatic to manual. This allows you to customize the scaling. To complete the process, click on **OK**.

Formula:

- **Measurement data**: the temperature and pressure measurement data for the measurement is displayed.

4 Using the testo 191 Professional software

- **Saturated steam pressure:** the measured and calculated pressure value is displayed on the chart and can be compared.
- **Lethality:** the lethality values of the data loggers are displayed.



In order to display the Saturated steam pressure or Lethality curves on the chart, the calculations must first be selected as described in the subsequent section 4.5.8.1.

Curves:

- The display of the curves can be modified in terms of colour, width, style and marker in the toolbar under **Curves**. This is done by clicking on the measuring point in the toolbar.

4.5.6 Raw data view

The Raw data view shows you the readings determined for the data loggers used. In this overview, you can view all the determined readings.

	TIME	DATE	CLP (min)	CLP (max)	CLP (act)	CLP (set)	CLP (diff)	CLP (err)
P1	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P2	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P3	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P4	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P5	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P6	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P7	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P8	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P9	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P10	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P11	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P12	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P13	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P14	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P15	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P16	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P17	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P18	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P19	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P20	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P21	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P22	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P23	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P24	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P25	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P26	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P27	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P28	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P29	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P30	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P31	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P32	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P33	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P34	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P35	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P36	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P37	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P38	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P39	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P40	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P41	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P42	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P43	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P44	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P45	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P46	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P47	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P48	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P49	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P50	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P51	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P52	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P53	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P54	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P55	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P56	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P57	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P58	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P59	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P60	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P61	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P62	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P63	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P64	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P65	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P66	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P67	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P68	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P69	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P70	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P71	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P72	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P73	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P74	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P75	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P76	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P77	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P78	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P79	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P80	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P81	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P82	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P83	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P84	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P85	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P86	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P87	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P88	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P89	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P90	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P91	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P92	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P93	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P94	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P95	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P96	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P97	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P98	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P99	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00
P100	2012-03-20 12:00:00	2012-03-20	12.00	12.00	12.00	12.00	0.00	0.00

4.5.7 Export to Excel



Since tampering cannot be ruled out when exporting measurement data to Microsoft Excel or other systems, we recommend evaluating the measurement data completely in the testo 191 Professional software. Once the Excel file has been exported, the .csv data can no longer be uploaded to the testo 191 Professional software. The original electronic raw data is stored in the .vi2 file.

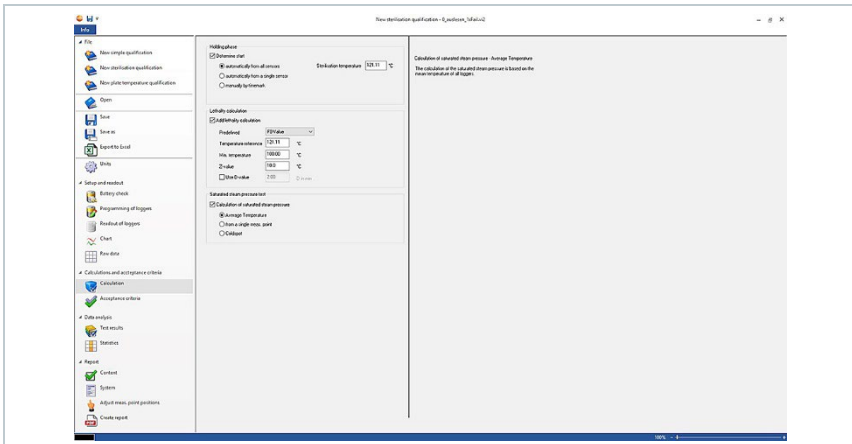
- 1 Click on **Export to Excel**.

- ▶ The measurement data is saved in a .csv file and can subsequently be further processed.

4.5.8 Sterilisation/pasteurisation measurement

4.5.8.1 Calculations

The testo 191 Professional software enables calculation of the holding phase, the lethality and the saturated steam quality.



- 1 Calculations:** required calculations can be selected.
- The calculation basis for determining the holding phase can be defined. Check the box for **Determine holding phase** and select the required calculation basis.
- Parameters for calculating the lethality can be defined. Check the box for **Add lethality calculation** and define the required parameters.
- The calculation basis for determining the saturated steam pressure test can be defined. Check the box for **Calculation of saturated steam pressure** and select the required calculation basis.

Holding phase

There are three options available for calculating the holding phase:

- **Automatically from all probes:** The holding phase is the longest period of time in which all data loggers achieve values above the specified sterilisation temperature.



To carry out automatic computation of the holding phase, a temperature set point must be entered manually in the field to the right.

- **Automatically from a single probe:** The holding phase is the longest period of time in which the selected data logger reports values above the specified sterilisation temperature.
- **Manually by timemark:** Time marks set in the chart can be selected as the start and end time of the holding phase.



Insert at least two time marks in the chart and position them at the required times. These time marks are automatically displayed in the chart. In Calculations, you can then select the time marks that were set.

Lethality calculation

For the lethality calculation, we provide you with predefined parameters. Nevertheless, you can apply individual settings to the lethality calculation.

- **Temperature reference:** The temperature reference for calculating the lethality depends on the process being performed. When carrying out heating processes at a temperature > 100 °C, use the temperature reference of 121.1 °C. If the heating process is carried out at a temperature of < 100 °C, the reference value depends on the product.
- **Minimum temperature:** Only values where the measured temperature is above the minimum temperature are taken into account for the lethality calculation. Here you can define the temperature at which the lethality calculation starts.
- **Z-value:** The Z-value for calculating the lethality depends on the germ present in the product. This value can be found in the package information leaflet for the biological indicators used and is usually ≤ 10. If you do not use biological indicators, the default value "10" is recommended for calculating the lethality rate.
- **D-value:** In the software, the D-value is not required for calculating the lethality. Here you can define whether the calculated lethality rate is output in "D".

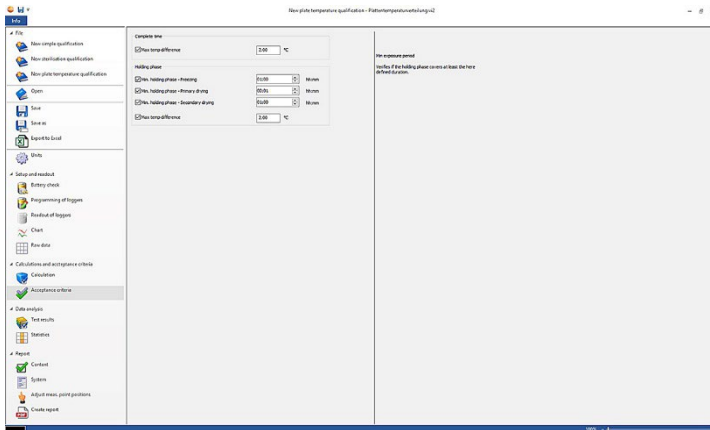
Saturated steam pressure test

There are three options for calculating the saturated steam quality:

- **Temperature mean:** The calculation of the saturated steam pressure is based on the mean temperature of all loggers.
- **From a single meas. point:** The calculation of the saturated steam pressure is based on the temperature values of the specified logger.
- **Coldspot:** The calculation of the saturated steam pressure is based on the coldest temperature value of all loggers at each time point.

4.5.8.2 Acceptance criteria

The following acceptance criteria for the sterilization measurement are available and can be defined:



Complete time

- **Max temp difference:** Verifies that at no time (over the complete measuring time) does the difference of temperature between the lowest and highest measuring point exceed the defined limit.

Holding phase

- **Min. warm-up phase:** Verifies that the minimum warm-up phase is observed.
- **Min exposure period:** Verifies that the holding phase covers at least the defined duration.
- **Max equilibration time:** Verifies that all loggers achieve the sterilisation temperature at the defined time. This enables a distinction to be made between **automatic** (reference measurement point is the first data logger to reach the sterilisation temperature) or **specify reference point** (reference measurement point is the selected data logger).
- **Max temp difference:** Verifies that at no time (during the holding phase) does the temperature difference between the data logger with the lowest measured temperature and the data logger with the highest measured temperature exceed the defined limit.
- **Temperature band:** Verifies that all measured temperature values are within a temperature band. The band starts at the process temperature and its width is defined here.
- **Min. cooling phase:** Verifies that the minimum cooling phase is observed.

Lethality calculation

- **Minimum acceptance level for lethality:** Verifies that all loggers achieve the defined lethality.

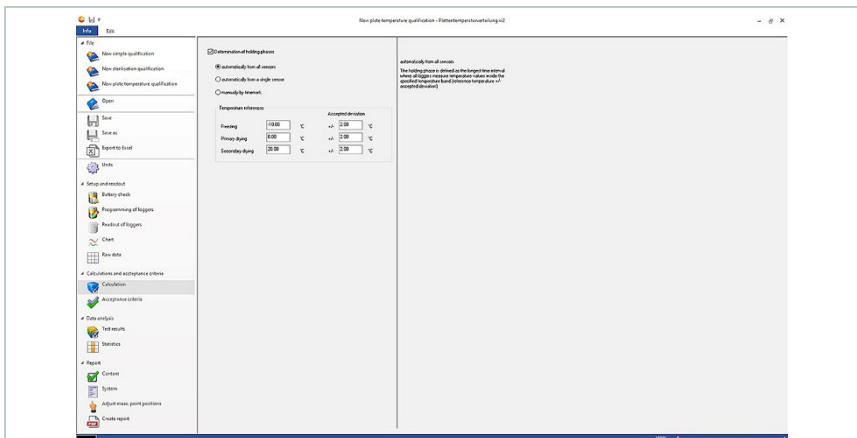
Saturated steam pressure test

- **Max pressure diff.:** Verifies that the difference between the calculated saturated steam pressure and the measured pressure (averaged over the holding phase) does not exceed the defined limit.

4.5.9 New plate temperature qualification

4.5.9.1 Calculations

The testo 191 Professional software enables both automatic calculation and manual definition and determination of the hold time.



1	Calculations: required calculations can be selected.
2	The calculation basis for determining the holding phase can be defined. To do this, tick Determine holding phase and select the required calculation basis.
3	Temperature references of the holding phases can be defined.
4	Accepted deviations can be defined.

Hold time

To calculate the hold time, you can choose between three options:

- **Automatically from all probes:** The holding phase is defined as the longest time interval where all loggers measure temperature values inside the specified temperature band (reference temperature +/- accepted deviation).



To carry out automatic computation of holding phases, the temperature references and the associated deviation must be entered manually in the empty fields.

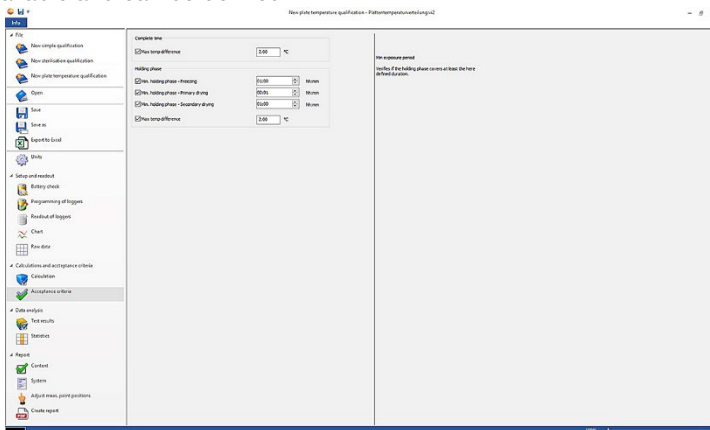
- **Automatically from a single probe:** The holding phase is defined as the longest time interval where the specified logger measures temperature values inside the specified temperature band (reference temperature +/- accepted deviation).
- **Manually by timemark:** The beginning and end of the holding phases can be set to time marks that are previously defined in the chart.



Insert time marks in the chart and position them at the required times. These time marks are automatically displayed in the chart. In Calculations, you can then select the time marks that were set.

4.5.9.2 Acceptance criteria

The following acceptance criteria for the new plate temperature qualification are available and can be defined:



Complete time

- **Max temp difference:** Verifies that at no time (over the complete measuring time) does the difference of temperature between the lowest and highest measuring point exceed the defined limit.

Holding phases

- **Min exposure period:** Verifies that the holding phase covers at least the defined duration.
- **Min exposure period for freezing:** Verifies that the holding phase covers at least the defined duration in the freezing phase.

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- **Min exposure period for primary drying:** Verifies that the holding phase covers at least the defined duration in the primary drying phase.
- **Min exposure period for secondary drying:** Verifies that the holding phase covers at least the defined duration in the secondary drying phase.
- **Max temp difference:** Verifies that at no time (during the holding phase) does the difference of temperature between the lowest and highest measuring point exceed the defined limit.

4.5.10 Test results

The Test results offer a quick overview, so that you can determine whether the previously defined acceptance criteria have been fulfilled.

Acceptance criterion	Status	Action
Temperature stability Verifies that all measuring points exhibit identical behavior. This is done by comparing the average temperature over the test duration with the average temperature of the measuring points. Test result: Acceptance criterion: Temperature stability (min): Passed 101.17 °C - 104.11 °C Temperature stability (max): Passed 101.87 °C - 104.81 °C	Failed	Edit test criteria
Temperature stability Verifies that all measuring points exhibit identical behavior. This is done by comparing the average temperature over the test duration with the average temperature of the measuring points. Test result: Acceptance criterion: Max temp difference (min): Passed 2.00 °C Temperature difference (min): Passed 2.00 °C	Failed	Edit test criteria
Temperature stability Verifies that all measuring points exhibit identical behavior. This is done by comparing the average temperature over the test duration with the average temperature of the measuring points. Test result: Acceptance criterion: Max temp difference (min): Passed 2.00 °C Temperature difference (min): Passed 2.00 °C	Failed	Edit test criteria
Temperature stability Verifies that the holding phase covers at least the time defined in the test. Test result: Acceptance criterion: Min exposure time (min): Passed 00:10:00 Exposure time (min): Passed 00:10:00 Last acquisition time: Passed 2021-03-10 11:10:10 Last acquisition time: Passed 2021-03-10 11:10:10	Passed	Edit test criteria
Temperature stability Verifies that the holding phase covers at least the time defined in the test. Test result: Acceptance criterion: Min exposure time (min): Passed 00:10:15 Exposure time (min): Passed 00:10:15 Last acquisition time: Passed 2021-03-10 11:10:15 Last acquisition time: Passed 2021-03-10 11:10:15	Passed	Edit test criteria
Temperature stability Verifies that all measuring points exhibit the same defined behavior. Test result: Acceptance criterion: Max temp difference (min): Passed 2.00 °C Temperature difference (min): Passed 2.00 °C Max temp difference (max): Passed 10.00 °C Temperature difference (max): Passed 10.00 °C	Passed	Edit test criteria
Temperature stability Verifies that the difference between the calculated and actual exposure time is within the defined limit. Test result: Acceptance criterion: Max exposure diff. (min): Passed 0.000000 Exposure time (min): Passed 0.000000 Last acquisition time: Passed 2021-03-10 11:10:10 Last acquisition time: Passed 2021-03-10	Passed	Edit test criteria

- **Test results:** quick identification of whether the acceptance criteria have been fulfilled.
- Acceptance criterion fulfilled:
- Acceptance criterion not fulfilled:
- **Edit test criteria:** definitions of acceptance criteria can be adapted.

4.5.11 Statistics

The Statistics section offers an overview of the readings determined for individual data loggers and of all the data loggers used.

Index	Min	Date	Time	Max	Date	Time	Avg	Standard deviation
44828004	18.87 °C	22.02.2019	16:00:00	19.63 °C	22.02.2019	16:20:00	19.25 °C	2.61 °C
44828002	18.31 °C	22.02.2019	16:00:00	18.21 °C	22.02.2019	16:20:00	18.26 °C	2.40 °C
44828001	18.05 °C	22.02.2019	16:10:00	18.79 °C	22.02.2019	16:20:00	18.60 °C	2.12 °C
44828004	0.17 bar	22.02.2019	16:30:00	3.37 bar	22.02.2019	16:20:00	1.60 bar	1.19 bar
Statistics over all temperature channels	18.05 °C	22.02.2019	16:10:00	19.63 °C	22.02.2019	16:20:00	18.69 °C	2.64 °C
Statistics over all pressure channels	0.17 bar	22.02.2019	16:30:00	3.37 bar	22.02.2019	16:20:00	1.60 bar	1.19 bar

The **Statistics** section provides information on the following data in the holding phase:

- Minimum reading
- Maximum reading
- Difference between maximum and minimum
- Avg
- Standard deviation
- Lethality rate (if selected in **Calculations**)
- Statistics over all channels



If the warm-up and cooling phases were previously selected and defined in the acceptance criteria, data from these two phases can also be taken from the statistics.

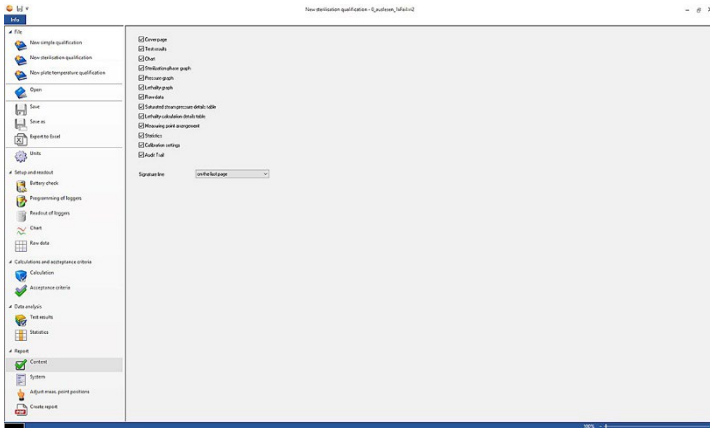
4.5.12 Content

The content of the report can be defined by enabling or disabling the contents.



The last defined report content is automatically applied to future reports.

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- **Content:** report content can be defined.
- Define contents by applying the respective check mark.
- **Signature line:** define the position of the signature fields in the report.
- **Cover page:** the cover page of the report contains the information added in the System section.
- **Test results:** the test results contain the information that was previously listed in the software under the item Test results.
- **Chart:** a chart showing the entire measurement process is displayed here. Time markers and notes that have been inserted previously are also shown here.
- **Sterilization phase graph:** the graph of the calculated or defined holding phase is output here. Time markers and notes that have been inserted previously are also shown here.
- **Pressure graph:** the graph of the measured and calculated pressure values is shown here.
- **Lethality graph:** a graph of the individual lethality rates is shown here. The accepted minimum lethality rate is also inserted in this graph.
- **Raw data:** here the readings are displayed in tabular form.
- **Saturated steam pressure details table:** in this table, the calculated pressure values for the temperature data loggers are shown in tabular form and with indication of time and date.
- **Lethality calculation details table:** in this table, the lethality rates are shown in tabular form and with indication of time and date.
- **Measuring point arrangement:** the exact placement of the data loggers during a measurement in a system can be found here.

- **Statistics:** the maximum reading, minimum reading as well as the mean value and standard deviation within the hold phases are displayed here. The lethality rate for the data loggers is also displayed. The statistics provide information about the values of each data logger individually, as well as about all temperature or pressure data loggers.
- **Calibration data:** the calibration status of the data loggers used can be found here.
- **Audit Trail:** the file audit trail is displayed here.

4.5.13 System

In the System section, any important information which should appear on a cover page of the report can be added. The fields Report title, Title and Entry are provided for you to fill out.

- 1 Click in the empty field under Report title.
- 2 Fill in the required report title.
- 3 Click in the empty field under Title.
- 4 Fill in the required title.
- 5 Click in the empty field under Entry.
- 6 Fill in the appropriate entry.



More information can be added to the cover page by clicking on the green plus sign. New fields for Title and Entry will appear. To remove the information entered, click on the red cross symbol.

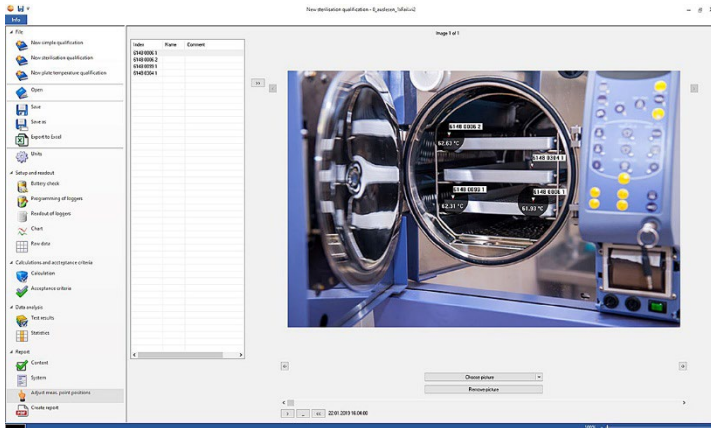
- 7 Save template.



The system section can be saved as a template and is then automatically loaded in the event of new measurements.

4.5.14 Adjust meas. point positions

To add image documentation to the report, measuring points can be inserted into images here. The data loggers used can be individually named and the measuring point can be described in more detail.



- **Adjust meas. point positions:** images can be attached to the report, the data loggers used can be individually named and the position during the measurement can be described.

1 | Click on **Choose picture**.





▶ | The selected image is added to the evaluation.



To add more images, click on **Choose picture** again.

2 | Click on **Remove picture**.

▶ | The selected image is deleted.

Up to 20 images can be attached to a report. Press  or  to scroll between the images. The order of the images can be changed by pressing  or .

4.5.14.1 Name and describe measuring point, insert measuring point into image or remove

The serial number of the data logger can be assigned a Name and a Comment description. The name then appears in addition to the serial number in tables and graphs of the report. The name can contain a maximum of 6 characters. The used data loggers (measuring points) can be inserted into an appended image. Thus the measuring point can be accurately tracked.

Index	Name	Comment
6148 0006 1		
6148 0006 2		
6148 0009 1		
6148 0304 1		

- 1 Name measuring point (use the mouse to click in the Name field)
- 2 Describe measuring point (use the mouse to click in the Comment field)
- 3 In one click, insert the measuring point with grey background into the image.



To position the measuring point at the correct place in the image, click on the tip of the arrow of the inserted measuring point, and move the measuring point while holding down the mouse button.

Right-click on the measuring point to remove the measuring point again.

4.5.15 Create report

- ✓ All the content required for the report must be selected.
- 1 Click on **Report** at the bottom of the left menu bar.
 - 2 Save report in the predefined folder, see PDF settings section.
- ▶ Report is automatically created and opened.



Depending on the defined report content, the duration of the report creation varies. Do not interrupt the saving process.

5 Creating templates

In order to simplify the editing of the processes, you can create templates. You can customize the scope of the template. You can create a suitable template consisting of Calculations, Acceptance criteria and System sections.



An established connection to the programming and readout unit is not required.

- 1 Open the PC software

- 2 | Select one of the three process templates.
 - ▶ | The selected process template opens.
- 3 | Click on **Calculations** in the left menu bar.
 - ▶ | Calculations section opens.
- 4 | Define the required calculations.
- 5 | Click on **Acceptance criteria** in the left menu bar.
 - ▶ | Acceptance criteria section opens.
- 6 | Define required acceptance criteria.
- 7 | Click on **Content** in the left menu bar.
 - ▶ | Content section opens.
- 8 | Define required report content.
- 9 | Click on **System** in the left menu bar.
 - ▶ | System section opens.
- 10 | Define contents for the cover page of the report.
- 11 | Click on **Save as** in the left menu bar.
 - ▶ | The created template is saved.



To open a created template, click on **Open** in the left menu bar after opening the PC software program.

6 Data backup and recovery

It is the responsibility of the IT administrator to set up backup and recovery procedures for the testo 191 Professional software.



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