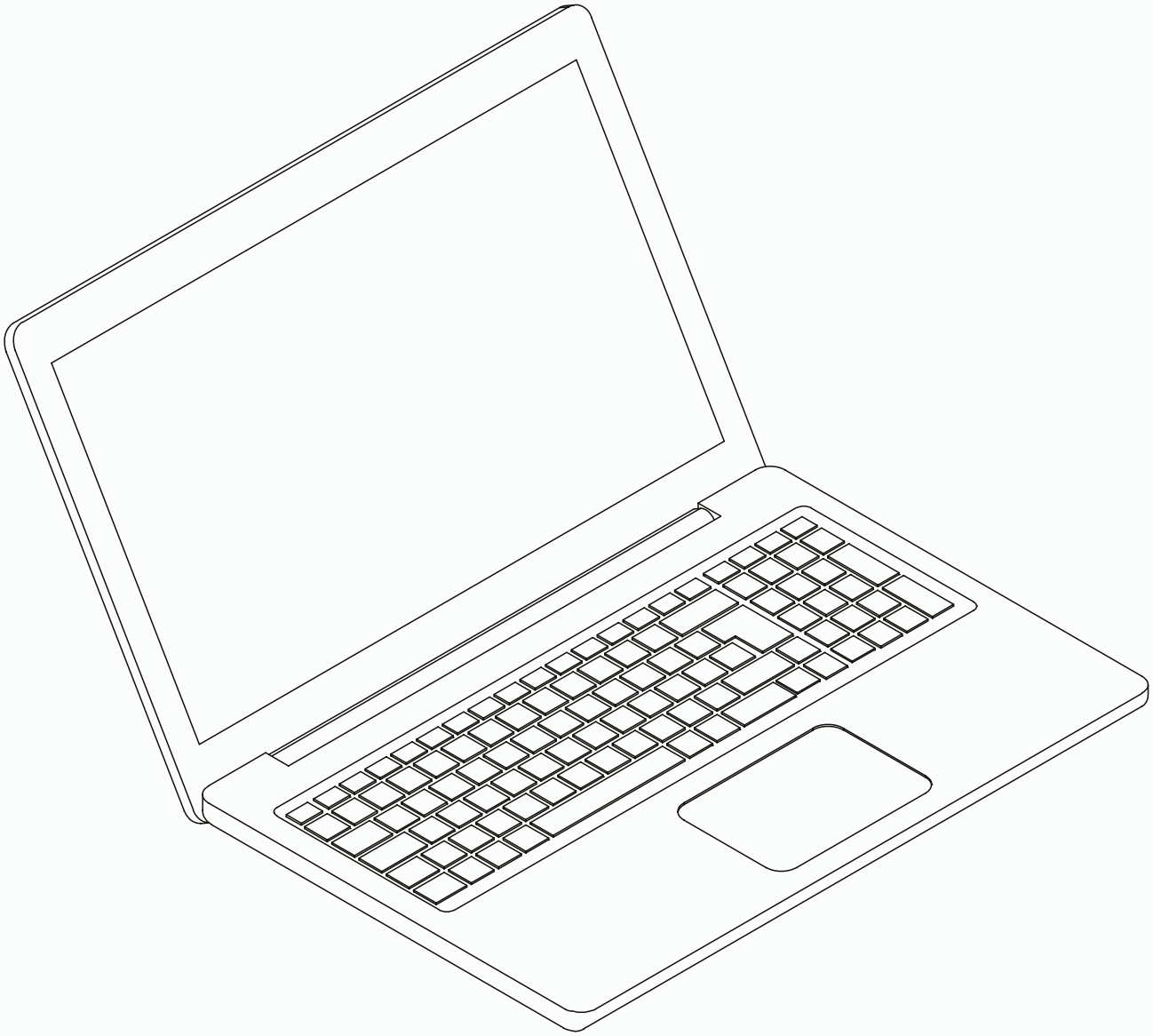

Operation Manual

Lyovapor™ software

BÜCHI

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Table of contents

1 General introduction

This manual is an integral part of the Lyovapor™ software. It describes the basic functions and provides information on the use of the software.
The Lyovapor™ software is used in conjunction with the Lyovapor™ L-200 Pro, L-250 Pro and L-300 Pro. When operating one of those instruments, the respective operating instructions must be followed.
The manual is aimed at laboratory staff.

1.1 Available languages

These operating instructions are available in different languages. The translations are installed as installation packages.

1.2 Mark-ups and symbols

NOTE

This symbol draws attention to useful and important information.

☑ This character draws attention to a requirement that must be met before the instructions below are carried out.

▶ This character indicates an instruction that must be carried out by the user.

⇨ This character indicates the result of a correctly carried out instruction.

Mark-up	Explanation
Window	Software Windows are marked-up like this.
Tab	Tabs are marked-up like this.
Dialog	Dialogs are marked-up like this.
[Button]	Buttons are marked-up like this.
[Field names]	Field names are marked-up like this.
[Menu / Menu item]	Menus or menu items are marked-up like this.
Status	Status is marked-up like this.
Signal	Signals are marked-up like this.

2 Installation

2.1 Technical requirements

The Lyovapor™ software can only be used with the following instruments:

- Lyovapor™ L-200 Pro
- Lyovapor™ L-250 Pro
- Lyovapor™ L-300 Pro

The instruments must be connected to the software program via a network or LAN interface.
For the software to function perfectly, the following technical requirements must be met:

Requirement	Minimum
Operating system	Windows 7 (Professional/Enterprise/Ultimate, 32/64-bit, SP1) Windows 10 (Pro/Enterprise, 64-bit)
Processor	Intel dual-core, 2.4 GHz
RAM	2 GB
Hard disk space	5 GB
Screen resolution	1280x1024 pixels
Installation	USB port
Connection	Ethernet

2.2 Backups

Lyovapor™ software backups save process results and configuration data.
Backups are performed by means of the BUCHI Database Manager with is installed along with the software and is then located on the computer's local hard drive. You can go to *[Settings]* > *[Software]* > *[Database]* to specify when reminders to create backups are to be issued.

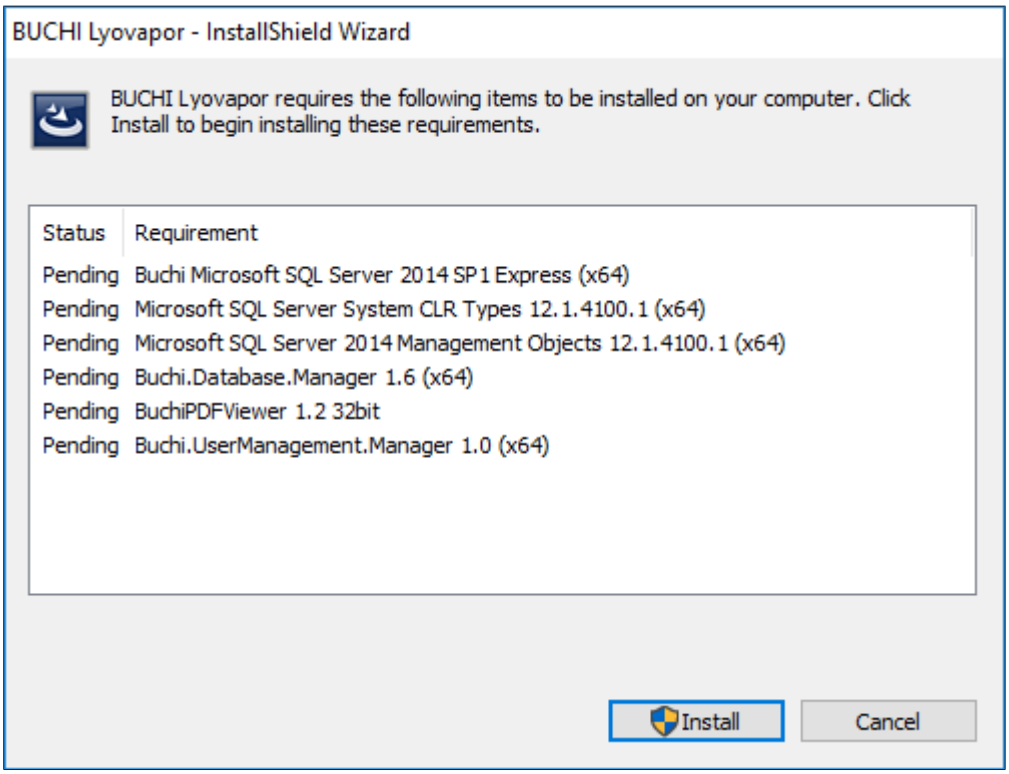
2.3 Installation

2.3.1 Installing the software

▶ Open the file Setup.exe on the installation disk by double-clicking it.

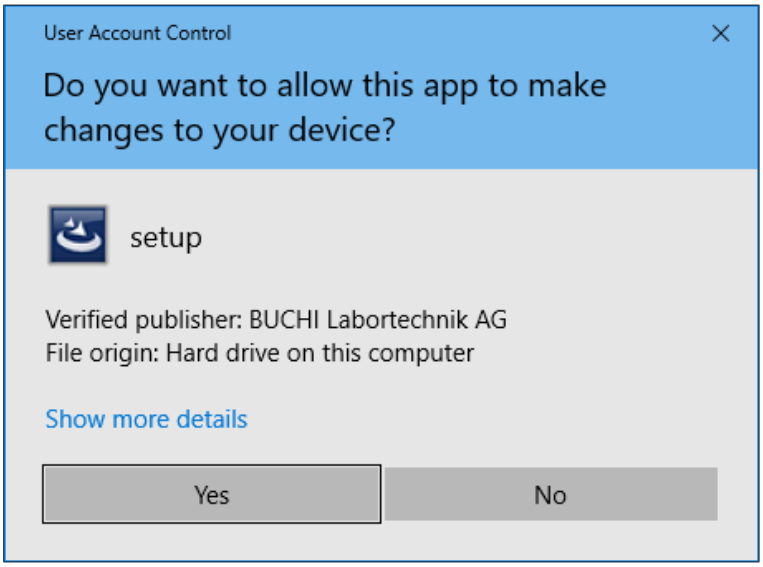
▶ Select *[Install Lyovapor]*™.

⇨ **InstallShield Wizard**The [ ] for the setup opens.



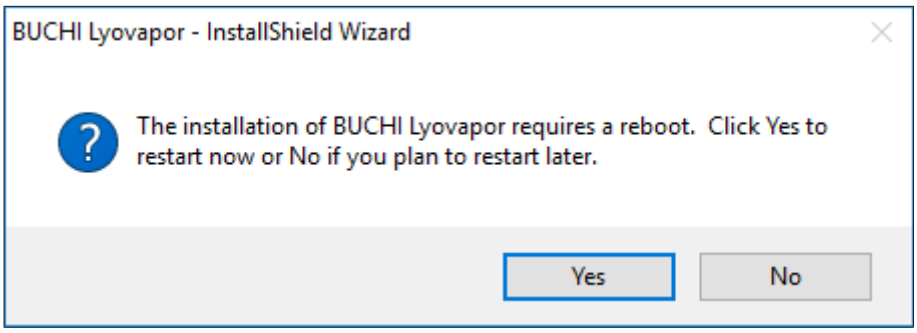
▶ In the **InstallShield Wizard** click *[Install]*.

▶ Answer *[Yes]* to the question **Do you want to allow this app to make changes to your device**.



⇨ SQL Server Express is installed.

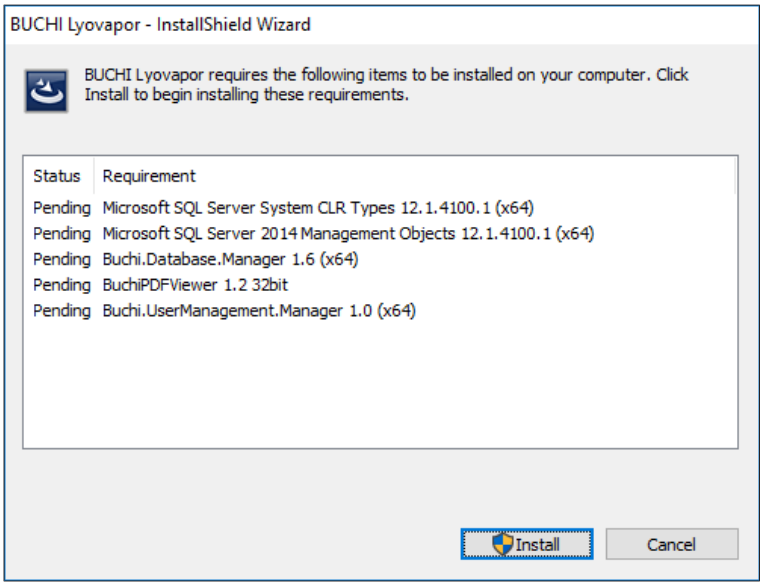
▶ Answer *[Yes]* to the question **The installation of BUCHI Lyovapor requires a reboot**.



⇨ The computer then performs a restart.

⇨ After the restart, the file Setup.exe should automatically run again; if it does not, you should start it again manually.

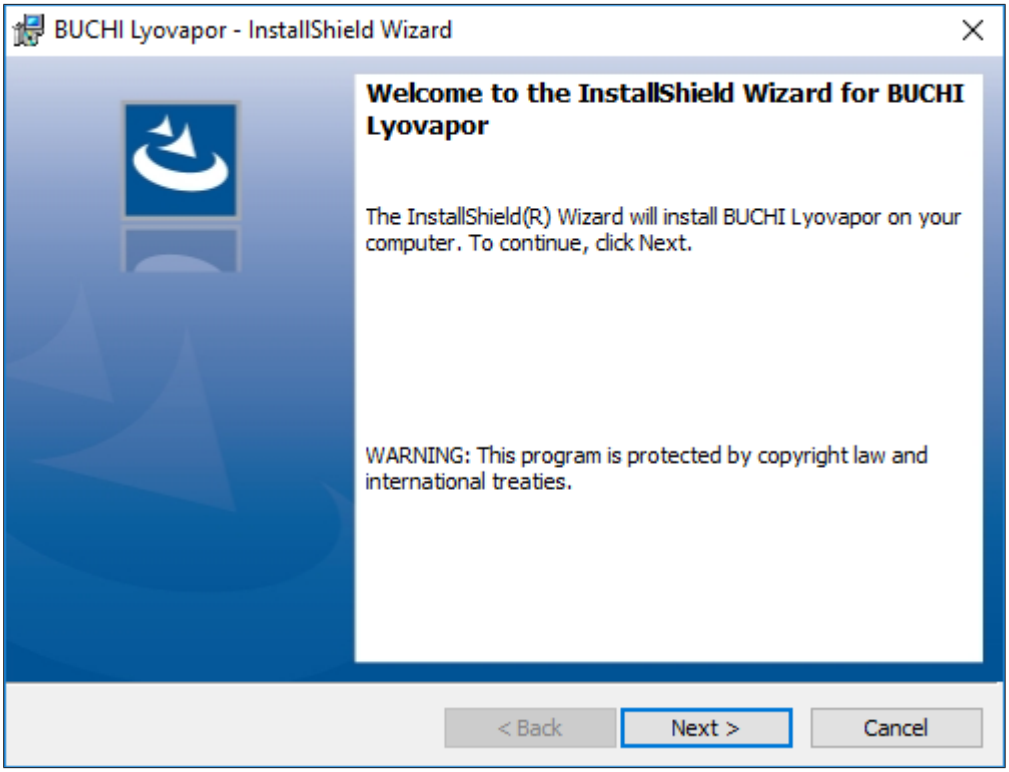
▶ To install the remaining components, click *[Install]* again.



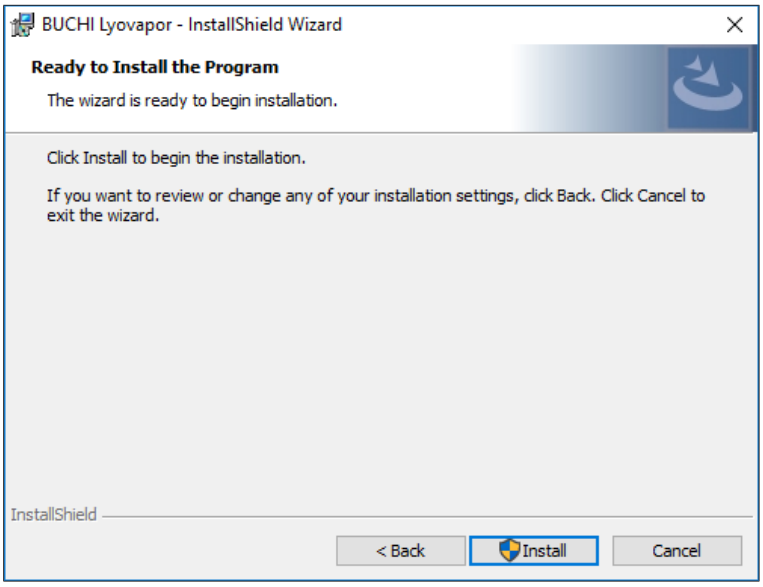
⇨ The remaining components listed are then installed.

⇨ The **InstallShield Wizard** for the Lyovapor software appears.

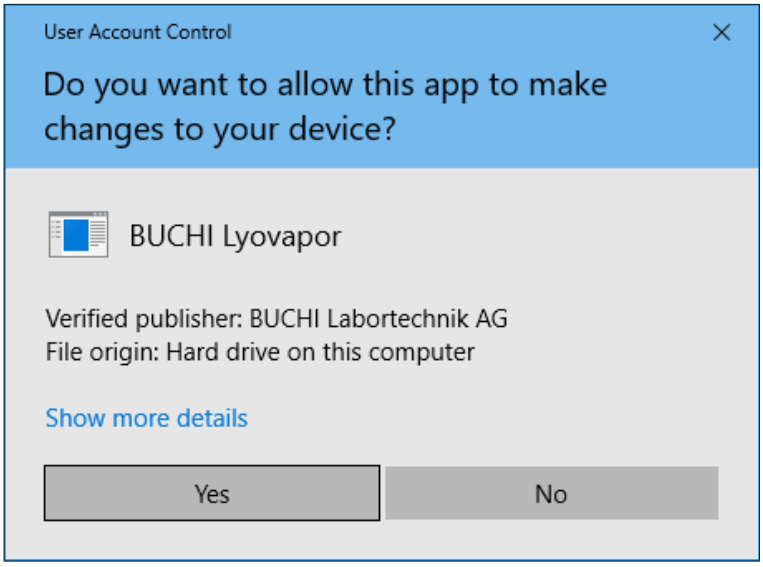
▶ In the **InstallShield Wizard** click *[Next]*.



- In the **License Agreement** window, read the licence agreement, select **I accept the terms in the license agreement** and then click *[Next]*.
- In the **InstallShield Wizard** click *[Install]*.

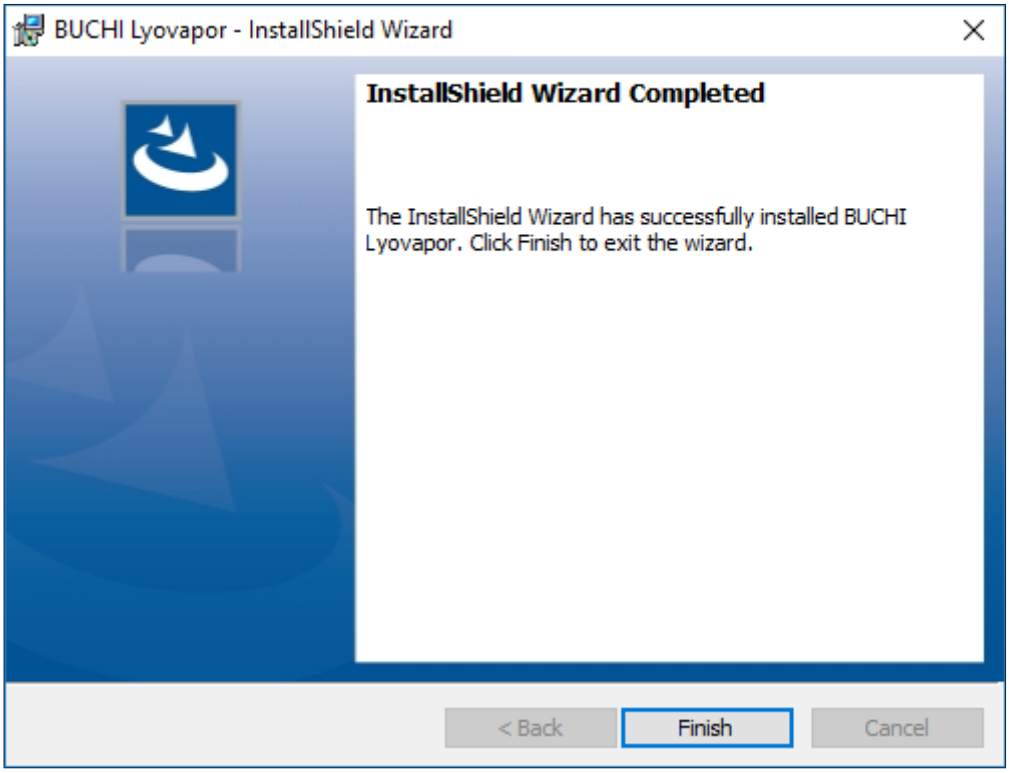


- Answer *[Yes]* to the question **Do you want to allow this app to make changes to your device**.



⇨ The Lyovapor™ software is then installed.

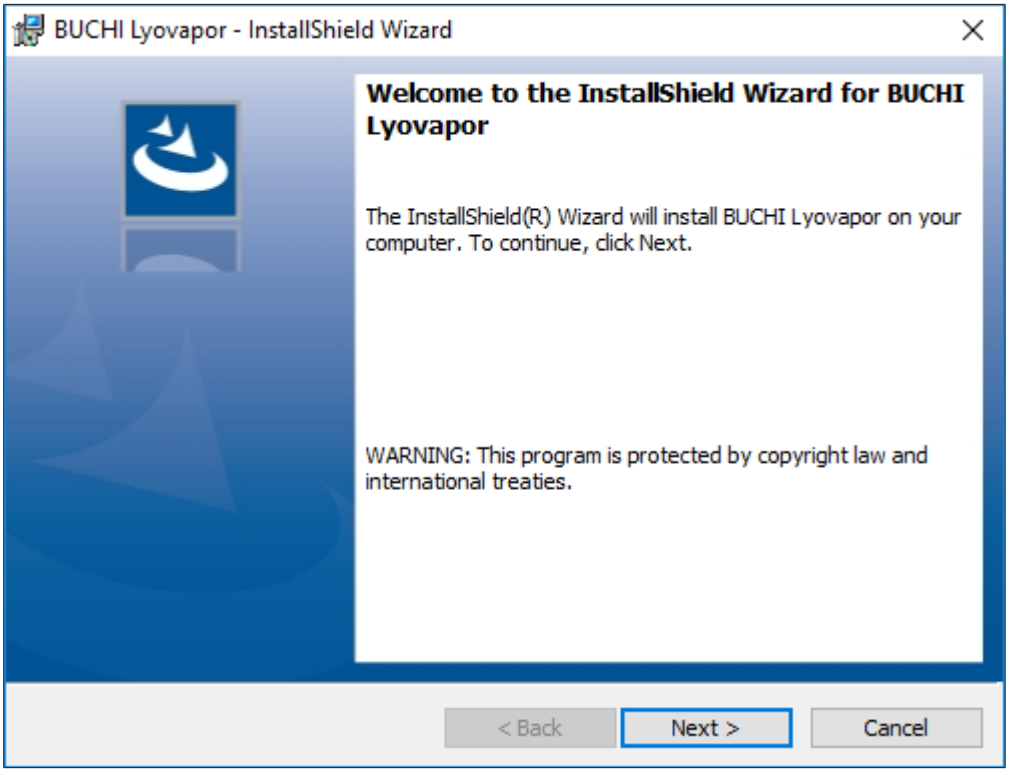
▶ To complete the installation, click *[Finish]*.



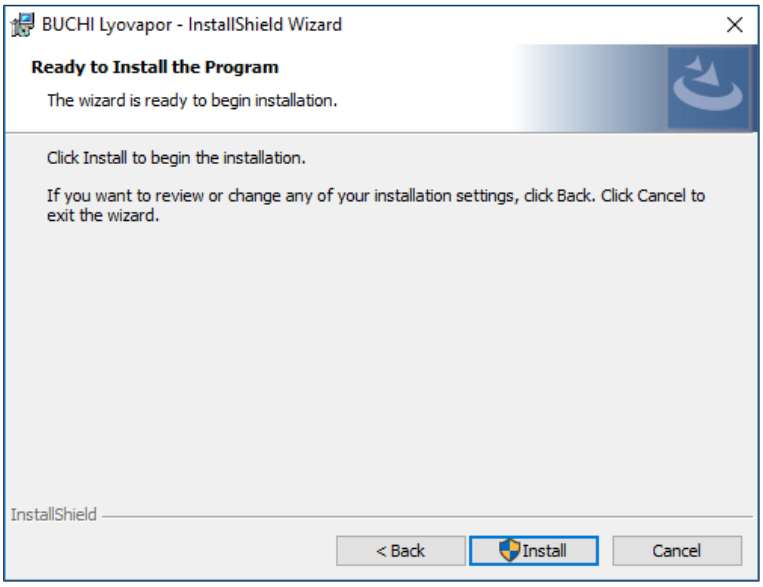
2.3.2 Reinstalling the software after uninstalling it

▶ Open the file Setup.exe on the installation disk by double-clicking it.

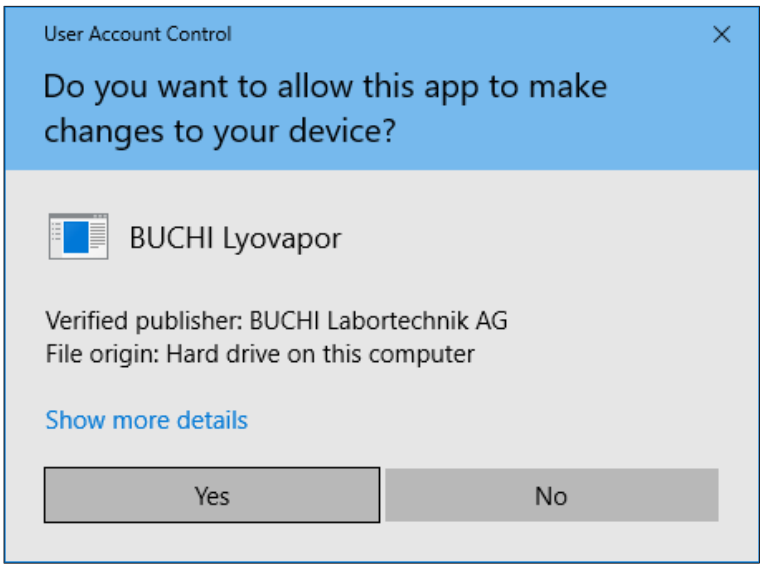
▶ In the **InstallShield Wizard** click *[Next]*.



- In the **License Agreement** window, read the licence agreement, select **I accept the terms in the license agreement** and then click *[Next]*.
- In the **InstallShield Wizard** click *[Install]*.

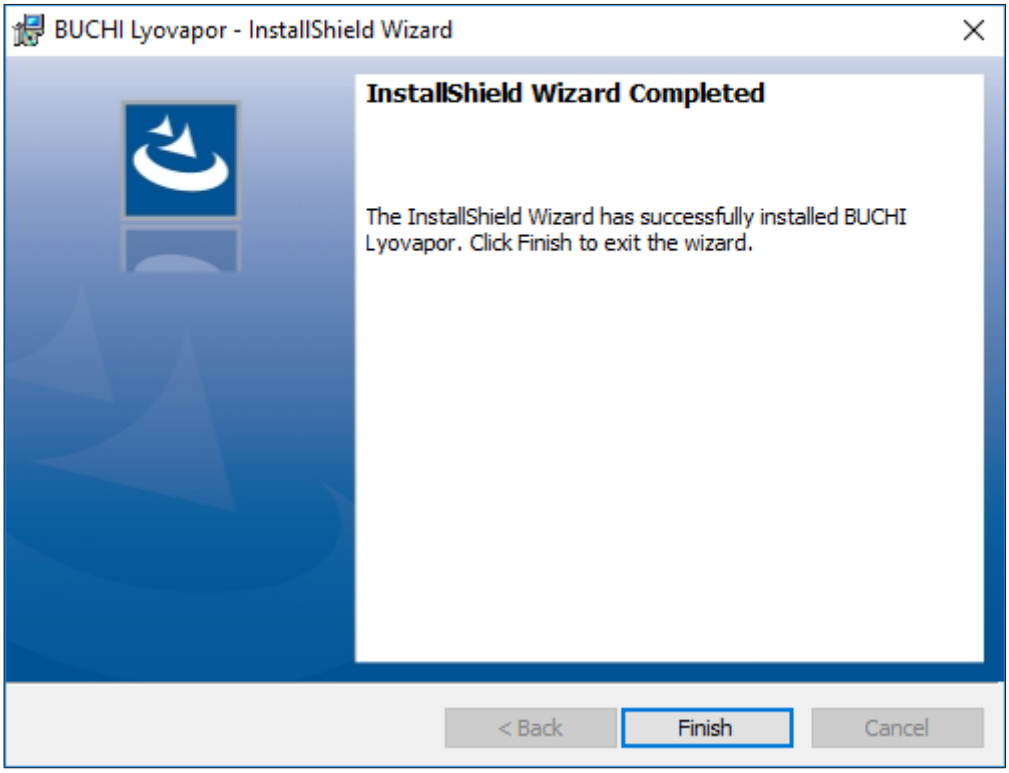


- Answer *[Yes]* to the question **Do you want to allow this app to make changes to your device**.



⇨ The Lyovapor™ software is then installed.

▶ To complete the installation, click *[Finish]*.



2.4 Logging in

When starting the software, you are required to log in.
Default login credentials:

- **User name**: **buchiadmin**
- **Password: buchi02**

The password can be changed as required; see Chapter 2.5 “Changing password”, page 13. Registration of other users is performed via **User Management**; see **BUCHI User Management Manual**.

The trial version of the software can be tried out for 60 days without purchasing a licence. In order to ensure uninterrupted use of the Lyovapor™ software, a software licence must be purchased 20 days before the trial period expires. For information about licensing and registration, please refer to the menu item *[Help]* > *[Licence]*.

2.4.1 Logging in

Precondition:

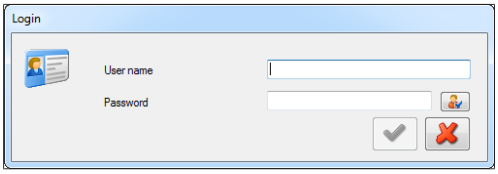
☑ The Lyovapor™ software is installed locally.

▶ Double-click the Lyovapor™ software shortcut to start the program.

⇨ The software status window appears.

▶ Click *[OK]*.

⇨ Software initialisation starts and the login window appears.



▶ Enter *[user name]* and *[password]* and click the tick to confirm.

⇨ Following successful authentication, the software user interface opens.

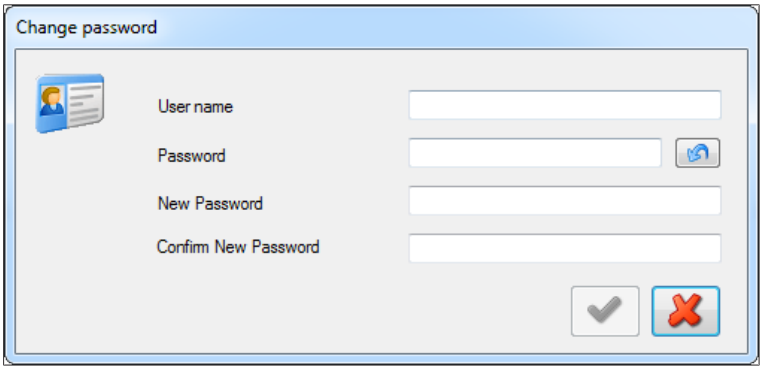
NOTE
After three failed login attempts, access to the system is blocked. Please contact BUCHI Software Support.

2.5 Changing password

The password can be changed when logging in.

▶ In the login window, click the  button.

⇨ The **Change password** window opens.



▶ Complete the boxes **User name**, **Password**, **New Password** and **Confirm New Password**.

▶ Click the tick to confirm.

2.6 Registration and licensing

The Lyovapor™ software must be registered and licensed. For information about licensing and registration, please refer to the menu item *[Help]* > *[Licence]*.

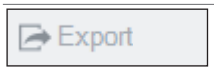
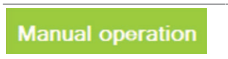
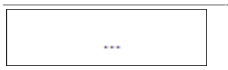
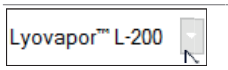
3 Description of the software

The Lyovapor™ software is used to monitor and control processes on the instruments Lyovapor™ L-200 Pro, L-250 Pro and L-300 Pro from a PC workstation.
The software provides the following range of functions and information features:

- Graphical and schematic monitoring of the instrument and the current process.
- Control of manual and automatic processes.
- Creation, editing, copying, importing and exporting of methods.
- Management of methods for the associated instrument via the software.
- Recording and managing of process parameters.
- Display, analysis, import, export, etc. of results.
- Process and error message management.

3.1 Input elements and controls

The Lyovapor™ software is operated by means of a mouse and keyboard. Menu options, list items, buttons and checkboxes are selected by means of the mouse.
The following input elements and controls are used:

Input element/ Control	Description	Meaning
	Active element	Active elements have a white background and respond to a mouse-click.
	Inactive element	Inactive elements have a grey background and do not respond to a mouse-click.
	Selected element	Selected elements are highlighted in green.
	Button	Software buttons are made to look like physical rectangular buttons.
	Drop-down list	To select an item from a drop-down list, you first click the arrow. A list then opens from which you can select one of the items by clicking on it.
	Input box	Allows you to enter text (e.g. numbers) manually by clicking on the input box
	Mouse-over function	If you hover the mouse over the information icon, additional explanatory information on the button or element concerned pops up.
	Expand/Collapse	Allows you to expand or collapse the menu.

3.2 User interface

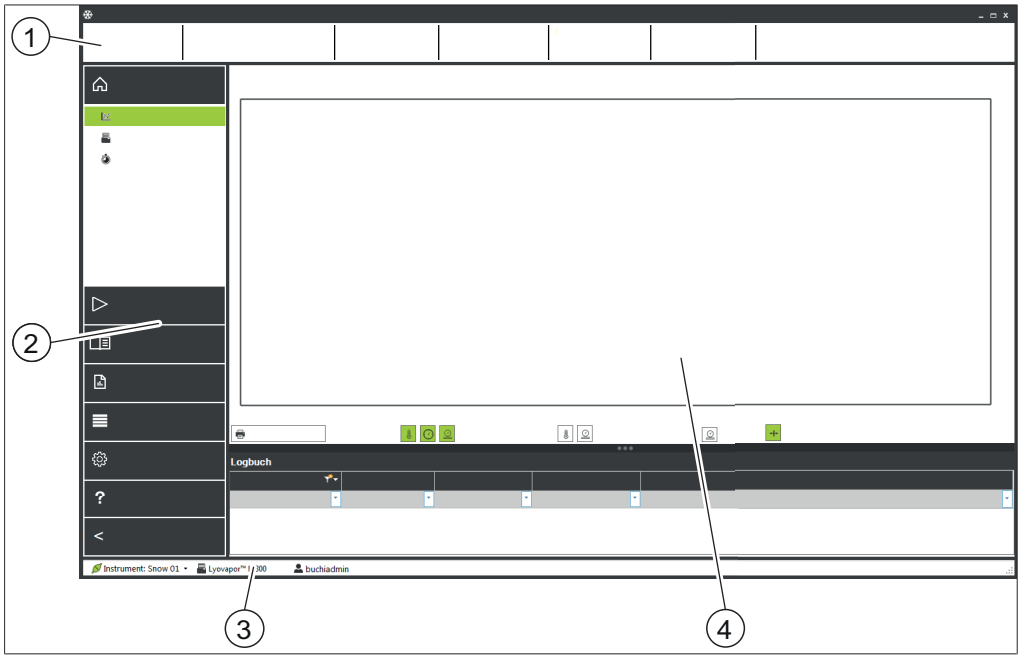


Fig. 1: User interface of the Lyovapor™ software

No.	Description	Function
1	Favourites bar	Shows process parameters saved as Favourites during a process.
2	Menu bar	Shows the program menu.
3	Status bar	Shows the connection status, the instrument type connected and the user currently logged in.
4	Content area	Shows current settings, submenus or actions depending on the current operation.

3.3 Favourites bar

The upper area of the user interface contains the Favourites bar. The Favourites bar is always visible and shows information on the current process, e.g. method name, phase and progress. You can specify which process parameters are shown on the Favourites bar by following the navigation path below on the *Favourites* tab:

Navigation path
➔Settings ➔Software

3.4 Menu bar

The Menu bar can be found in the panel on the left-hand side of the user interface. The Menu bar is always visible and has up to 2 levels depending on menu option. You can collapse the Menu bar by clicking on the main menu heading so that only the menu icons are visible.

The Menu bar contains the main menu options for using the Lyovapor™ software. Menu items currently selected on the first level are expanded so that the submenu items on the second level are visible. Selected submenu items are highlighted in green and the item contents shown in the content area.

Menu symbol	Meaning	Submenu
	*[Information]* menu	• Graph • Instrument • Timers
	*[Operation]* menu	• Automatic • Manual • System tests • Service
	*[Methods]* menu	• Manager • Transfer
	*[Results]* menu	• Manager
	*[Log]* menu	• Messages • Log
	*[Settings]* menu	• Software • Graph • Report • Connections
	*[Help]* menu	• About the Lyovapor™ software

NOTE

The individual menu items and submenu items are described below. For details of the practical execution of the actions described, see Chapter 4 “Using the software”, page 28.

3.4.1 Information menu

The main menu item *[Information]* is the home screen of the Lyovapor™ software and shows the status of the connected instrument.

Submenu Graph

The submenu *[Graph]* shows the progression of a process as a graph of sensor readings. The graph plots the process pressure and temperature against time. Axis information and curves can be shown or hidden on the graph as required.
The lower part of the content area lists messages related to the current process.

Submenu Instrument

The submenu *[Instrument]* shows the instrument as a schematic diagram and any faults that have occurred on the Lyovapor™. The schematic diagram can be customised by selecting manifold or heated shelves as drying chamber. When a process is in progress, a table shows information on the current drying shelf temperature, pressure in the drying chamber and temperature of the samples.

Submenu Timers

The submenu *[Timers]* shows details of the times for primary drying, secondary drying and the duration of the freeze drying process as a whole within a method.

3.4.2 Operation menu

The main menu item *[Operation]* contains functions for preparing, starting and controlling automatic and manual processes, performing system tests and viewing service data.

Submenu Automatic

The submenu *[Automatic]* contains the following actions for automatic process control:

- Condition, see Chapter 4.3 “Preparing the instrument”, page 42.
- Activate method, see Chapter 4.4.1 “Selecting a method”, page 43.
- Edit current method, see Chapter 4.4.3 “Changing method steps while the process is running”, page 44.
- Start freeze-drying, see Chapter 4.4.2 “Starting freeze-drying”, page 43.
- Switch to manual mode, see Chapter 4.4.4 “Switching to Manual mode”, page 44.
- Venting, see Chapter 4.4.6 “Ending freeze-drying”, page 45.
- Deactivate sample protection, see Chapter 4.4.5 “Cancelling sample protection”, page 45.

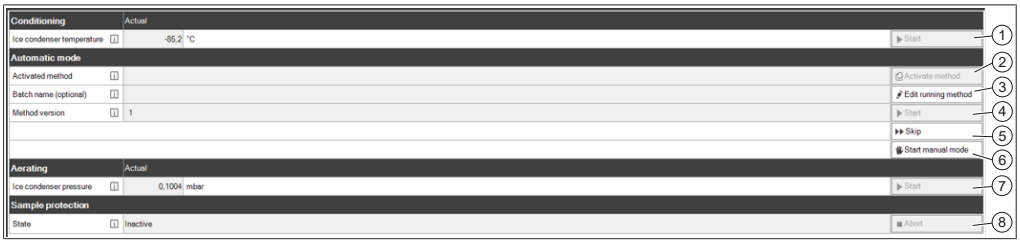


Fig. 2: Content area for submenu Automatic

Process sequence

Before carrying out an automatic freeze-drying process, the instrument must have been conditioned.
Only once conditioning has been completed:

- the instrument's top-mount drying rack can be loaded with the samples,
- a method can be activated (2),
- and the freeze-drying process can be started (4).

It is possible to edit the running method and adjust parameters (3) or switch to manual mode (6) while the process is running.
Once the sample is completely dried, the freeze-drying process is concluded by aerating the instrument (7).

Sample protection

Sample protection is automatically activated if the pressure is outside the safety pressure limits and the temperature outside the safety temperature limits.

To prevent collapse of the sample, drying shelf heating is switched off while sample protection is active. As a result, the sample temperature drops back below the safety temperature limit and the freeze-drying process is then continued as programmed.

Towards the end of the primary phase of the freeze-drying process, the sample temperature will naturally reach and exceed the safety temperature due to the decreasing sublimation. To deal with that situation, an end time is defined (see Chapter “Setting safety temperature action for primary drying”, page 31). The setting

entered for the parameter *[End time]* ensures that sample protection is deactivated towards the end of the primary drying phase and thus ensures that the freeze-drying process is successful.

Sample protection has to be cancelled (8) if the sample temperature reaches the safety temperature before the set end time. The sample protection function has to be manually cancelled before the freeze-drying process is interrupted by activation of sample protection. See Chapter 4.4.5 “Cancelling sample protection”, page 45.

Submenu Manual

The submenu *[Manual]* is further subdivided into the tabs *Manual operation* and *Manual end tests*.

The tabs contain the following actions for manual process control:

- *Manual operation* tab:
  - Condition, see Chapter 4.3 “Preparing the instrument”, page 42.
  - Set process parameters and start freeze-drying, see Chapter 4.5.1 “Starting freeze-drying”, page 46.
  - Stoppering.
  - Vent, see Chapter 4.5.4 “Ending freeze-drying”, page 48.
  - Idle mode, see Chapter 4.5.5 “Go to standby”, page 48.
- *Manual end tests* tab:
  - End point definition, see Chapter 4.5.3 “Endpoint determination”, page 47.

Manual operation

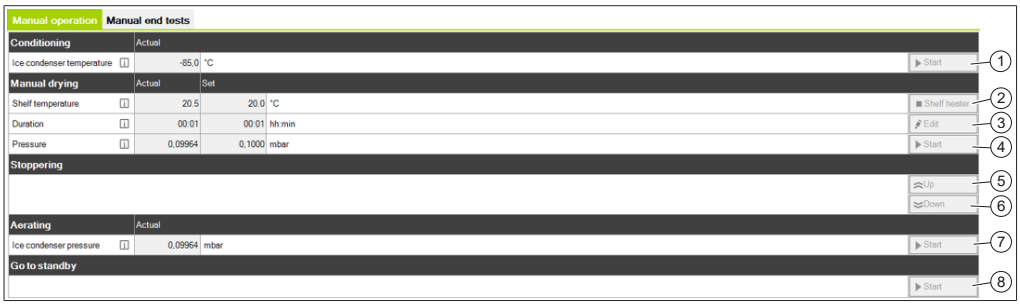


Fig. 3: Content area for Manual operation tab on submenu Manual

The precondition for carrying out an manual freeze-drying process is that the instrument has been conditioned before starting the process (1). Only once conditioning has been completed can the instrument's top-mount drying rack be loaded with the samples, the process parameters for manual freeze-drying be set (3) and the freeze-drying process be started (4). Process parameters can be continuously adjusted during the freeze-drying process (3).
During manual freeze-drying, the temperature of the drying shelves can be controlled by switching on the shelf heating (2).
The last step of a phase can be skipped with the skip button and the next phase is initiated (5).
Mechanical stoppering enables vials to be sealed by moving the stoppering cover up and down (6).
Once the sample is completely dried, the freeze-drying process is concluded by venting the instrument (7). After completion of the freeze-drying process, the instrument can be set to idle mode (8).

Manual end tests

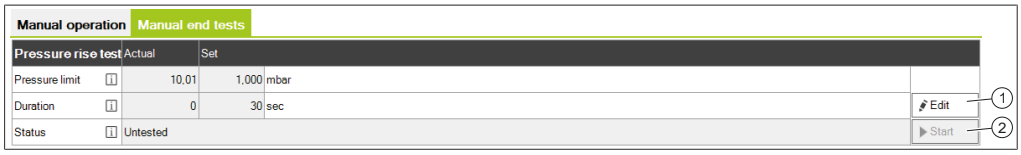


Fig. 4: Content area for Manual end tests tab on submenu Manual

NOTE

The pressure rise test can only be controlled via the software with the Lyovapor™ L-300 Pro, see Chapter 4.5.3 “Endpoint determination”, page 47.

To determine the end point of the freeze-drying process, a pressure rise test can be carried out manually while freeze-drying is in progress. To do so, the parameters for the pressure rise test are defined (1) and the pressure rise test then started (2).

Submenu System tests

The submenu *[System tests]* provides functions for testing the vacuum and leak-tightness of the instrument before carrying out freeze-drying processes. To that end, the submenu *[System tests]* offers the following two tests:

- Vacuum test, see Chapter 4.6.1 “Performing vacuum test”, page 48
- Leak test, see Chapter 4.6.2 “Performing leak test for L-200 Pro / L-250 Pro”, page 49 or Chapter 4.6.3 “Performing leak test for L-300 Pro”, page 50

Submenu Service

The submenu *[Service]* shows the operating hours for the individual components of the connected instrument.
The following operating hours are shown (depending on the pump type):

- Operating hours of the oil pump
- Next vacuum pump oil exchange warning
- Operating hours of the vacuum pump/scroll pump
- Operating hours of the refrigeration system
- Operating hours of the steam generator
- Stoppering counter
- Total instrument operating hours

3.4.3 Methods menu

The main menu item *[Methods]* provides functions for managing methods.

Submenu Manager

The submenu *[Manager]* allows you to view and filter all methods. Methods can be created, imported, exported, edited, deleted, copied and cloned.

Button		Meaning
	Import	Imports a method, see Chapter 4.2.8 “Importing a method”, page 41.
	Exporting	Exports a method, see Chapter 4.2.9 “Exporting a method”, page 42.
	New	Creates a new method, see Chapter 4.2.1 “Creating a new method”, page 29.

Button		Meaning
	Edit	Edits an existing method, see Chapter 4.2.2 “Setting general method parameters”, page 29, Setting end point definitions, Chapter 4.2.3 “Setting the phases of a method”, page 30 and Chapter 4.2.5 “Setting the steps of a method”, page 37. Alternatively, you can open a method by double-clicking it.
	Delete	Deletes a method, see Chapter 4.2.10 “Deleting a method”, page 42.
	Copy	Copies a method. When a selected method is copied, the method name is retained and only the version number is incremented. Making a copy of a method is useful if only individual parameters of the freeze-drying process (e.g. pressure, time, temperature) are to be changed but the sample and basic parameters are to stay the same.
	Clone	Clones a method. When a selected method is cloned, a new method name can be chosen and all parameters of the freeze-drying process are copied over. The version numbering restarts at 1.

If a method is already being edited by another user, the method can be opened using **View**. However, the data cannot be edited in that case.

Submenu Transfer

The submenu *[Transfer]* provides functions for transferring methods between the software program and the instrument. That enables methods created in the software program to be transferred to the instrument for carrying out processes. Similarly, methods can be transferred from the instrument back to the software program. Methods no longer required on the instrument can be deleted on the submenu *[Transfer]*. A maximum of 35 methods can be stored on the instrument.

3.4.4 Results menu

The main menu item *[Results]* provides functions for managing the results of processes carried out. The processes carried out are listed under *[Results]* once the process has been completed. The process data concerned is transferred automatically in the background while the software is running, either when the process has been completed or when the software connects to the instrument.

Submenu Manager

The submenu *[Manager]* displays a list containing the results of all processes carried out. The process results can be sorted according various defined filters.
Actions for managing process results:

Button		Meaning
	Graph	Opens/displays results of a completed process as a graph. Alternatively, the graph can be opened/viewed by double-clicking the process results.
	Report	Creates a report. For details of the settings for the report contents, see Chapter “Submenu Report”, page 25.
	Import	Imports results from a file
	Export	Exports results to a file

Button		Meaning
	Export CSV	Exports results to a CSV file
	Delete	Deletes results
	Edit Comment	Edits comments on a set of results

Graph of process results

NOTE

Buttons are active if they are shown in green.

Function buttons for graph view

Button		Meaning
	Print graph	Prints the graph of the selected process results.
	Temperature axis	Shows/hides temperature axis grid.
	Time axis	Shows/hides time axis grid.
	Pressure axis	Shows/hides pressure axis grid.
	Fixed axis range: Temperature axis	Fixes the temperature axis range as the currently visible range
	Fixed axis range: Pressure axis	Active: Fixes the pressure axis range as the currently visible range.
	Logarithmic axis: Pressure axis	Shows pressure axis either as logarithmic or linear scale.
	Cursor	Shows/hides cursor on the graph.

3.4.5 Log menu

The main menu item *[Log]* provides functions for managing messages from the instrument and the Lyovapor™ software.

Submenu Messages

The submenu *[Messages]* lists current and past messages. Notifications generated during the process can be acknowledged here.
Currently present and unacknowledged messages are listed under Notifications.
The lower part of the content area under Log book shows the message history for the instrument.

Message status	Meaning
x	Acknowledged
<	Sent
>	Received

Submenu Log

The submenu *[Log]* lists all messages relating to the Lyovapor™ software. The messages can be exported, searched and updated, and set filters can be cleared. The maximum number of log entries displayed (1000 - All) can be set below the message list.

Button		Meaning
	Export	Exports the current list of messages as a text file.
	Search	Searches for messages. The search criteria can be defined in the *Search* window. The following buttons are available: • *[Find next]*: The next message matching the search criteria is displayed and highlighted in orange. • *[Find all]*: All messages matching the search criteria are displayed and highlighted in orange. • *[Cancel]*: Cancels the search. The following checkboxes are available for refining the search: • *[Match case]* • *[Match entire cell contents]* • *[Search up]*: The list searched from bottom to top.
	Clear filters	Clears all filters set.
	Refresh	Updates the list of messages.

The message types *[Fault]*, *[Warning]*, *[Information]* and *[Audit]* can be highlighted in colour in the messages list by clicking the buttons at the top right of the content area.

Message type	Highlight colour
Error	Red
Warning	Amber
Info	Grey
Audit	Green

3.4.6 Settings menu

The main menu item *[Settings]* provides options for entering settings for the software, the graphs, the report and instrument connections.

Submenu Software

The submenu *[Software]* provides options for entering settings for software handling, database and favourites.

The content area for the submenu *[Software]* is subdivided into the tabs *General*, *Database* and *Favourites*.

Settings on the *General* tab:

Setting		Option	Meaning
Units	*[Pressure unit]*	mbar/hPa/Torr/ mTorr/mmHg	Sets the unit of pressure for vacuum.
	[Temperature unit]	°C/°F/°K Pressure limit, Duration	Sets the unit of temperature
Exporting	*[Default export path]*	Path	Defines the export path
	[Default export path for CSV files]	Path	Defines the export path for CSV files
	[Delimiter for CSV files]	Comma ","/Vertical bar "|"/ Semicolon ";"/ Tab character	Defines the delimiter to be used in exported CSV files
Import	*[Default import path]*	Path	Defines the import path
Language	*[Display language]*	Selection list of available languages	Sets display language
	[Log language]	Selection list of available languages	Sets the log language
Show message window	*[Message type(s)]*	Error/Warning, Error/Information, Error warning/Off	Messages of this type are shown in a pop-up window.

Settings on the *Database* tab:

Setting		Option	Meaning
Records database	*[Name]*	View	Name of the records database
	[Version]	View	Records database version
	[File]	View	File path of the records database
	[Size]	View	File size of the records database
	[Data usage]	View	Data usage of the records database
	[Size warning limit]	Enter setting	For entering the size limit at which the records database size warning is generated. When the program is started, a notification is displayed if the records database has exceeded the specified size limit.

Setting		Option	Meaning
Configuration database	*[Name]*	View	Name of the configuration database
	[Version]	View	Configuration database version
	[File]	View	File path of the configuration database
	[Size]	View	File size of the configuration database
	[Data usage]	View	Data usage of the configuration database
	[Size warning limit]	Enter setting	For entering the size limit at which the configuration database size warning is generated. When the program is started, a notification is displayed if the configuration database has exceeded the specified size limit.
Database backup	*[Reminder interval]*	Select/Deselect checkbox Enter setting	For entering the interval at which a reminder to back up the database is to be issued. The data is backed up locally on the computer using the BUCHI Database Manager application. It is advisable to back up the data to a server or other external storage medium as well. Creating a backup requires the BUCHI Database Manager application. The following databases can be backed up: • LyovaporConfig database: saves the settings and user management data • LyovaporRecords database: saves the methods, results and log book For more information, please refer to the manual for the BUCHI Database Manager.

Settings on the *Favourites* tab:

Button	Meaning
	Resets configuration to default settings.
	Adds a process parameter to Favourites.
	Removes a parameter from Favourites.

Button	Meaning
	Moves an item one place up in the list.
	Moves an item one place down in the list.

Submenu Graph

The submenu *[Graph]* provides options for entering settings for graphs, curves and process phases.

The content area for the submenu *[Graph]* is subdivided into the tabs *General*, *Curves* and *Phases*. The *[Reset]* button can be used to reset entries to the default settings.

Settings on the *General* tab:

Setting		Option	Meaning
General	*[Line thickness]*	Enter setting using Up/Down arrow or enter figure	Sets the line thickness for the pressure and temperature traces.
	[Highlighted line thickness]	Enter setting using Up/Down arrow or enter figure	Sets the line thickness for the selected curve.
	[Legend]	Select/Deselect checkbox	Shows/hides the legend for the graph.
Tolerance bands	*[Collapse temperature tolerance band]*	Select/deselect checkbox and select *[colour]* using button	Changes the colour of the tolerance band
	[Set pressure tolerance band]	Select/deselect checkbox and select *[colour]* using button	Changes the colour of the tolerance band

Settings on the *Curves* tab:

Setting	Option	Meaning
Lines	Select/deselect checkbox and select *[colour]* using button	Shows/hides individual data traces. Sets the colours of the curves.

Settings on the *Phases* tab:

Setting	Option	Meaning
Process phases	Select/deselect checkbox and select *[colour]* using button	Shows/hides process phases. Sets background colours for process phases

Submenu Report

The submenu *[Report]* provides options for the contents of a report.

The content area for the submenu *[Report]* is subdivided into the tabs *General* and *Curves*. The *[Reset]* button can be used to reset entries to the default settings.

Settings on the *General* tab:

Setting		Option	Meaning
Company	*[Name]*	Enter name	Name of the company to be shown on the report.
	[Logo]	Upload image	Uploads the company logo.
Sections	*[Graph]*	Select/Deselect checkbox	Selects/deselects process graph for the report.
	[Method]	Select/Deselect checkbox	Selects/deselects method data for the report.
	[Method steps]	Select/Deselect checkbox	Selects/deselects method steps for the report.
	[Instrument log book]	Select/Deselect checkbox	Selects/deselects instrument log book for the report.
Graph	*[Line width]*	Enter setting using Up/Down arrow or enter figure	Sets the line thickness for the pressure and temperature traces.
	[Show temperature axis grid]	Select/Deselect checkbox	Shows/hides temperature axis grid for the report.
	[Show time axis grid]	Select/Deselect checkbox	Shows/hides time axis grid for the report.
	[Show pressure axis grid]	Select/Deselect checkbox	Shows/hides pressure axis grid for the report.
	[Logarithmic pressure axis]	Select/Deselect checkbox	Shows pressure axis either as logarithmic or linear scale.
Print	*[Default printer]*	Select available printer	Sets the default printer.
	[Default paper format]	A4/Letter	Sets default paper format

Settings on the *Curves* tab:

Setting	Option	Meaning
Lines	Select checkbox	Activates the process parameters to be shown on the report graph.

Submenu Connections

The submenu *[Connections]* provides functions for managing connections between instruments and the Lyovapor™ software.
The option *[Favourite instruments]* shows a list of the saved instruments with details of instrument name, control panel serial number and IP address. Instruments can be deleted from that list.

The option *[Search results]* allows you to search the network for instruments. Alternatively, you can search for a known IP address. Instruments listed in the search results can then be added to the Favourite instruments list and then a connection established between the instrument and the software. See Chapter 4.1 “Establishing a connection to a Lyovapor™ instrument”, page 28.

3.4.7 Help menu

The main menu item *[Help]* provides licence information and instructions for using the software.

Submenu About Lyovapor™ software

The main menu item *[Help]* provides options for opening the software manual and help on licensing. Software registration, licence import and details of the current licence are also managed from the *[Help]* menu.

3.5 Status bar

The lower area of the user interface contains the Status bar. The Status bar shows the connection status, the instrument type connected and the user currently logged in. The connection status indicates which instrument is currently connected to the Lyovapor™ software. The connection status context menu allows you to switch between instruments and/or disconnect connections.

3.6 Content area

In the centre of the user interface is the content area for the menu item currently selected. Menu items may be further subdivided into 2 or 3 tabs in the content area. The open tab is highlighted in green. Depending on the menu item selected, the content area may show information on the process and settings or provide options for entering settings.

4 Using the software

4.1 Establishing a connection to a Lyovapor™ instrument

4.1.1 Connecting via existing network

Navigation path

➔ Settings ➔ Connections

Precondition:
☑ Instrument is connected via network or LAN interface.

▶ Navigate to the submenu *[Connections]* via the navigation path.
▶ To search for instrument in the network, click on the button *[Find instruments]*.
Option: if you know the IP address, click *[Find IP address]*, enter the IP address in the *IP address* window and click *[OK]* to confirm.

⇨ All available instruments in the network are listed in *[Search results]*.

▶ Click on the desired instrument.

⇨ The selection is highlighted in green.

▶ To connect the instrument to the software, click the *[Add]* button.

⇨ The instrument is saved in the *[Favourite instruments]* list in the upper content area of the *[Connections]* menu.

▶ To connect the desired instrument with the Lyovapor™ software, select it from the list at the bottom left of the Status bar.

⇨ The instrument is then connected to the software can be controlled from the computer.

4.1.2 Connecting without existing network

Precondition:
☑ The PC's IP address is known. To identify the IP address, use the "ipconfig" command or contact your local IT support.
☑ Wifi is deactivated on the PC.

▶ Disconnect the instrument from the network.
▶ On the instrument, navigate to *[Settings]* and *[Network]*.
▶ Deactivate the function *[DHCP]*.
▶ In the *IP address* field, enter the PC's IP address, but with a different last digit.
Example: Enter "10.0.0.2" when the PC's IP address is "10.0.0.1".
▶ Restart the instrument.
▶ Use an Ethernet cable to connect the instrument directly to the PC.
▶ In the Lyovapor™ software, search for the instrument's IP address and establish a connection as described in Chapter 4.1.1 “Connecting via existing network”, page 28.

NOTE
The instrument can be reconnected again via network.

▶ Activate *[DHCP]* in the instrument's network settings.
▶ Restart the instrument.
▶ Connect the instrument again as described in Chapter 4.1.1 “Connecting via existing network”, page 28.

4.2 Editing a method

The Lyovapor™ software provides the facility for editing and saving methods. The methods enable the freeze-drying process to be automated.

4.2.1 Creating a new method

Navigation path

➔Methods ➔Manager

- ▶ Navigate to the submenu *[Manager]* via the navigation path.
- ▶ In the content area of the submenu *[Manager]*, click the button *[New]*.

⇨ The *New method* window opens.

- ▶ Enter a name for the method in the box *[Name]*.
- ▶ From the drop-down list *[Instrument type]*, select the instrument on which the method is to be carried out.
- ▶ Click *[OK]* to confirm your entries.

⇨ The *[Edit]* window opens.

NOTE

For information on editing the parameters of the new method, see Chapter 4.2.2 “Setting general method parameters”, page 29, Chapter 4.2.3 “Setting the phases of a method”, page 30 and Chapter 4.2.5 “Setting the steps of a method”, page 37.

4.2.2 Setting general method parameters

Navigation path

➔Method ➔Manager

- ▶ Navigate to the submenu *[Manager]* via the navigation path.
- ▶ In the content area of the submenu *[Manager]*, click the button *[Edit]*.

⇨ The *Edit* window opens.

- ▶ The *General* tab provides the following general method parameter settings:

Setting	Option	Meaning
[Name]	View	Name of the method
[Version]	View	Version number of the method
[User interface]	View	Type of user interface
[Instrument type]	Lyovapor™ L-200 Pro L-250 Pro L-300 Pro	Sets the instrument type.
[Drying chamber type]	Bell/Manifold	Sets drying chamber type.
[Sample collapse temperature]	Enter setting	Sets the temperature at which the sample collapses.
[Gas type]	Enter setting	Sets the gas type used for venting the system.
[Comment]	Enter comment	For entering additional notes on the method.

4.2.3 Setting the phases of a method

NOTE

The settings for the phases of a method affect all steps of a phase.

Navigation path

➔Method ➔Manager

- ▶ Navigate to the submenu *[Manager]* via the navigation path.
- ▶ In the content area of the submenu *[Manager]*, click the button *[Edit]*.

⇨ The *Edit* window opens.

- ▶ On the *General* tab, set the parameters for the phases of a method.
- ▶ Click *[OK]* to confirm your entries.

The following settings for the phases of a method are available:

Phase	Setting	Option	Meaning
[Primary drying] and *[Secondary drying]*	*[Pressure rise test]*[1)]	Select/Deselect checkbox	Selected: pressure rise test is carried out. Deselected: pressure rise test is not carried out. See Chapter “Editing pressure rise test”, page 36
	[Pressure difference test]	Select/Deselect checkbox	Selected: pressure difference test is carried out. Deselected: pressure difference test is not carried out. See Chapter “Editing pressure difference test”, page 33
	[Temperature difference test]	Select/Deselect checkbox	Selected: temperature difference test is carried out. Deselected: temperature difference test is not carried out. See Chapter “Editing temperature difference test”, page 35
	[Safety temperature action]	Active sample protection and Message/Message only	Maximum divergence below the set sample collapse temperature before the sample protection function is activated. See Chapter “Setting safety temperature action for primary drying”, page 31 and Chapter “Setting safety temperature action for secondary drying”, page 32
	[Safety pressure action]	No action/Sample protection/ Warning message	No action: no action is carried out. Sample protection: sample protection is activated if the safety pressure limit is exceeded. Warning message: a warning message is displayed if the safety pressure limit is exceeded.

Phase	Setting	Option	Meaning
[Stoppering]	*[Mode]*	Not used/Manual	Not used: stoppering is not used. Manual: vial sealing (stoppering) is performed manually.
	[Pressure zone]	Minimum/Regulated/Ambient pressure	Minimum: the maximum vacuum is applied to reach the lowest possible pressure. Regulated: stoppering is carried out below a defined pressure Ambient pressure: system is aerated to ambient pressure.
	[Pressure]	Enter setting	For stoppering in regulated pressure range, enter pressure to be regulated for the stoppering phase.
[Hold]	*[Shelf temperature]*	Enter setting	Specifies a temperature for the shelves.
	[Pressure zone]	Minimum/Regulated/Ambient pressure	Minimum: the maximum vacuum is applied to reach the lowest possible pressure. Regulated: the settings for pressure are applied. Ambient pressure: system is aerated to ambient pressure.
	[Pressure]	Enter setting	For holding in regulated pressure range, enter pressure to be regulated for the holding phase.

[1)] Pressure rise test is only possible with Lyovapor™ L-300 Pro.

Setting safety temperature action for primary drying

Navigation path

➔Method ➔Manager

- ▶ Navigate to the submenu *[Manager]* via the navigation path.
- ▶ In the content area of the submenu *[Manager]*, click the button *[Edit]*.

⇨ The *Edit* window opens.

- ▶ On the *General* tab, select the checkbox in the *[Safety temperature action]* panel under *[Primary drying]*.

⇨ When the checkbox is selected, the preset settings are displayed.

- ▶ To set the parameters for the safety temperature action for primary drying, click the ··· button in the *[Safety temperature action]* panel.

⇨ The *Edit* window opens.

- ▶ In the *Edit* window, set the parameters for the safety temperature action.
- ▶ Click *[OK]* to confirm your entries.

The following settings are provided for the safety temperature action (primary drying):

NOTE

When setting the parameter *[End time]* you should take account of the following:

In the natural progression of the freeze-drying process, the sample temperature rises due to the decreasing sublimation and reaches the set safety temperature towards the end of the primary drying phase. In order to prevent activation of sample protection towards the end of the process, the parameter *[End time]* has to be set. The setting entered for the parameter *[End time]* ensures that sample protection is deactivated towards the end of the primary drying phase and thus ensures that the freeze-drying process is successful.

IMPORTANT: If the sample temperature reaches the safety temperature before the set end time, sample protection is activated, thus suspending the freeze-drying process for as long as sample protection is active. To prevent the freeze-drying process being interrupted, sample protection must be manually cancelled as soon as it is activated. See Chapter 4.4.5 “Cancelling sample protection”, page 45.

Setting	Option	Explanation
[Sample protection]	Active sample protection and Message/Message only	Active sample protection and Message: sample protection is activated if the sample temperature reaches the safety temperature, a notification message is sent. Message only: a notification message is sent, sample protection is not activated.
[Safety temperature below collapse temperature]	Enter setting	Sets the maximum divergence below the set sample collapse temperature before the sample protection function is activated.
[End time]	Enter setting	Sets the time from which sample protection is to be deactivated. The value relates to the time before completion of the primary drying phase.

Setting safety temperature action for secondary drying

Navigation path

➔Method ➔Manager

- ▶ Navigate to the submenu *[Manager]* via the navigation path.
- ▶ In the content area of the submenu *[Manager]*, click the button *[Edit]*.

⇨ The *Edit* window opens.

- ▶ On the *General* tab, select the checkbox in the *[Safety temperature action]* panel under *[Secondary drying]*.

⇨ When the checkbox is selected, the preset settings are displayed.

- ▶ To set the parameters for the safety temperature action for secondary drying, click the ··· button in the *[Safety temperature action]* panel.

⇨ The *Edit* window opens.

- ▶ In the *Edit* window, set the parameters for the safety temperature action.
- ▶ Click *[OK]* to confirm your entries.

The following settings are provided for the safety temperature action (secondary drying):

Setting	Option	Explanation
[Sample protection]	Active sample protection and Message/Message only	Active sample protection and Message: sample protection is activated if the sample temperature reaches the safety temperature, a notification message is sent. Message only: a notification message is sent, sample protection is not activated.
[Safety temperature below collapse temperature]	Enter setting	Sets the maximum divergence below the set sample collapse temperature before the sample protection function is activated.
[End time]	Enter setting	Sets the time from which sample protection is to be deactivated. The value relates to the time before completion of the secondary drying phase.

4.2.4 Setting end point definitions

The end of a phase can be defined by setting the end point definition.
The end point can be defined by means of the following test:

- Temperature difference test
- Pressure difference test
- Pressure rise test

It is possible to use a single test or combine these tests.
It is possible to use the tests for automatic transition to the next phase. However, automatic transitions are only carried out when the tests are passed.
Settings:

***[Continue]* / *[Proceed]* action setting**	**Explanation**
Yes	The test is used for automatic transition.
No	The test is not used for automatic transition. Automatic transition relies on other tests.

Editing pressure difference test

The pressure difference test establishes the difference between the readings from two pressure sensors in the drying chamber. If the difference between the two sensor readings is below a threshold, the freeze-drying phase can be ended.

NOTE

The pressure difference test parameters can be set for the primary drying phase and the secondary drying phase. The procedure for setting the parameters is the same for both phases.

NOTE

The preconditions of the test procedure below are only required for starting the test. To simply edit the settings, the preconditions can be ignored.

Navigation path
➔Method ➔Manager

Precondition:
☑ Pressure sensors are connected to the upper connection of the drying chamber.
☑ The freeze-drying process has been started.

▶ Navigate to the submenu *[Manager]* via the navigation path.
▶ In the content area of the submenu *[Manager]*, click the button *[Edit]*.

⇨ The *Edit* window opens.

▶ On the *General* tab, *[select]* the checkbox in the *[Pressure difference test]* panel under *[Primary drying]* and/or **Secondary drying**.

⇨ When the checkbox is selected, the preset settings are displayed.

▶ To set the parameters for the pressure difference test for primary drying and/or secondary drying, click the ··· button in the *[Pressure difference test]* panel.

⇨ The *Edit* window opens.

▶ In the *Edit* window, set the parameters for the pressure difference test.
▶ Click *[OK]* to confirm your entries.

The following parameter settings are available for the pressure difference test:

Setting	Option	Explanation
[Pressure difference limit]	Enter setting	Specifies the difference between the two sensor readings below which the end point is reached.
[Test time]	Enter setting	The period of time during which the difference is not to be exceeded. If the threshold is not exceeded for the full duration of the test, the pressure difference test is passed.
[Start time]	Enter setting	Sets the time from which the pressure difference test is to be performed. The value relates to the time before completion of the primary drying phase or the secondary drying phase.
[Proceed]	Select/Deselect checkbox	Selected: the method switches to the next phase. Deselected: the drying phase is carried out for the time defined in the *[Table]* tab.
[Message]	Select/Deselect checkbox	Selected: A message is generated if the pressure difference test is passed. Deselected: No message is generated.

Editing temperature difference test

The temperature difference test establishes the difference between the readings from temperature sensor for the heated shelf and the temperature sensor in the sample. If the difference between the two sensor readings is below a threshold, the freeze-drying phase can be ended.

NOTE

The temperature difference test is successfully completed if all drying shelves are below the threshold.

The samples on a drying shelf have different drying times. Take account of the different drying times when setting the *[Test duration]*.

NOTE

The pressure rise test parameters can be set for the primary drying phase and the secondary drying phase. The procedure for setting the parameters is the same for both phases.

NOTE

The precondition of an installed temperature sensor is only required for starting the procedure. To simply edit the settings, this precondition can be ignored.

Navigation path

➔Method ➔Manager

Precondition:

☑ The heated shelves are fitted in the rack.

☑ The optional temperature sensor has been installed.

▶ Navigate to the submenu *[Manager]* via the navigation path.

▶ In the content area of the submenu *[Manager]*, click the button *[Edit]*.

⇨ The *Edit* window opens.

▶ On the *General* tab, *[select]* the checkbox in the *[Temperature difference test]* panel under *[Primary drying]* and/or **Secondary drying**.

⇨ When the checkbox is selected, the preset settings are displayed.

▶ To set the parameters for the temperature difference test for primary drying and/or secondary drying, click the ··· button in the *[Temperature difference test]* panel.

⇨ The *Edit* window opens.

▶ In the *Edit* window, set the parameters for the temperature difference test.

▶ Click *[OK]* to confirm your entries.

The following parameter settings are available for the temperature difference test:

Setting	Option	Explanation
[Temperature difference limit]	Enter setting	Specifies the difference between the two sensor readings below which the end point is reached.
[Test time]	Enter setting	The period of time during which the difference is not to be exceeded. If the threshold is not exceeded for the full duration of the test, the temperature difference test is passed.

Setting	Option	Explanation
[Start time]	Enter setting	Sets the time from which the temperature difference test is to be performed. The value relates to the time before completion of the primary drying phase or the secondary drying phase.
[Proceed]	Yes/No	Yes: the method switches to the next phase. No: the method ends when the predefined time is up.
[Message]	Yes/No	Selected: A message is generated if the temperature difference test is passed Deselected: No message is generated.

Editing pressure rise test

NOTE

It is advisable to carry out a leak test before starting a method. Take account of the *[result]* of the leak test in the settings for *[Pressure limit]* and *[Duration]*.

NOTE

The pressure rise test is only possible with the Lyovapor™ L-300 Pro.

The pressure rise test parameters can be set for the primary drying phase and the secondary drying phase. The procedure for setting the parameters is the same for both phases.

Navigation path

➔Method ➔Manager

Precondition:

☑ A pressure sensors has been placed in the drying chamber.

☑ A leak test has been carried out and was successfully completed. See Chapter 4.6 “System tests”, page 48.

▶ Navigate to the submenu *[Manager]* via the navigation path.

▶ In the content area of the submenu *[Manager]*, click the button *[Edit]*. Alternatively, double-click on the selected method.

⇨ The *Edit* window opens.

▶ On the *General* tab, *[select]* the checkbox in the *[Pressure rise test]* panel under *[Primary drying]* and/or **Secondary drying**.

⇨ When the checkbox is selected, the preset settings are displayed.

▶ To set the parameters for the pressure rise test for primary drying and/or secondary drying, click the ··· button in the *[Pressure rise test]* panel.

⇨ The *Edit* window opens.

▶ In the *Edit* window, set the parameters for the pressure rise test.

▶ Click *[OK]* to confirm your entries.

The following parameter settings are available for the pressure rise test:

Setting	Option	Explanation
[Pressure limit]	Enter setting	Pressure increase (delta p) within the programmed duration of test. Choose this value under consideration of the leak rate of the instrument itself.
[Duration]	Enter setting	Specifies the length of time for which the pressure rise test is to be carried out.
[Pause time]	Enter setting	Time between repetitions of the test.
[Start condition]	Pressure and temperature difference test successful/ Pressure difference test successful/Temperature difference test successful/Time before phase end	Pressure and temperature difference test successful: The pressure rise test is only carried out if the temperature difference test and the pressure difference test are both passed. Pressure difference test successful: The pressure rise test is only carried out if a pressure difference test is passed. Temperature difference test successful: The pressure rise test is only carried out if a temperature difference test is passed. Time before phase end: The pressure rise test is carried out when the specified time has elapsed
[Start time]	Enter setting	Sets the time from which the pressure difference test is to be performed. The value relates to the time before completion of the primary drying phase or the secondary drying phase.
[Continue]	Yes/No	Yes: the method switches to the next phase. No: the phase is ended when the set levels are reached.
[Message]	Yes/No	Selected: A message is generated if the pressure rise test is passed Deselected: No message is generated.

4.2.5 Setting the steps of a method

NOTE

The upper part of the content area on the *Table* tab is where the steps of a method are set, added or deleted.

The lower part of the content area of the *Table* is where the process times for the primary drying phase, secondary drying phase and total time for both phases are displayed.

NOTE

If a phase has different drying shelf temperatures, an additional step must be added between the individual steps so as to effectively control the drying shelf temperature. The maximum heating rate of 3°C/min relates to empty drying shelves.

Navigation path

➔Method ➔Manager

▶ Navigate to the submenu *[Manager]* via the navigation path.

▶ In the content area of the submenu *[Manager]*, click the button *[Edit]*.

⇨ The *Edit* window opens.

▶ Switch to the *Table* tab.

▶ On the *Table* tab, set the parameters for the steps of a method.

▶ Click *[OK]* to confirm your entries.

The following settings are available for each step:

Setting	Option	Meaning
[Phase]	Primary drying/ Secondary drying	Shows the step phase
[Duration]	Enter setting	Sets the duration of the step in minutes.
[Drying shelf set temperature]	Enter setting	Sets the temperature of the heated shelves at the end of the phase. The temperature increases continuously during the step to reach the defined temperature.
[Shelf temperature gradient]	Automatically calculated value	Shows the temperature gradient for the drying shelf temperature.
[Pressure zone]	Regulated/Minimum	Regulated: the set pressure is applied. Minimum: the maximum vacuum is applied to reach the lowest possible pressure.
[Pressure set value]	Enter setting	Sets a target value for the regulated pressure.
[Safety pressure limit]	Enter setting	Absolute value for divergence from the set pressure before the sample protection function is activated.
[Safety pressure duration]	Enter setting	Sets the period of time that the pressure is allowed to exceed the safety pressure before the sample protection function is activated.

NOTE

The applied parameter settings for pressure and temperature are shown in a graph on the *Graph* tab. See Chapter “Editing steps on the graph”, page 39

Adding a step (primary drying)

▶ To add a step in the primary drying phase, click on a step with the phase Primary drying in the content area of the *Table* tab.

⇨ The selected step number is highlighted in green.

▶ **NOTICE! The step can be inserted before or after the selected step.**
Option 1: To add a step before the selected step, click the button *[Insert before]*.
Option 2: To add a step after the selected step, click the button *[Insert after]*.

⇨ A step with the phase Primary drying is inserted before or after the selected step.

Adding a step (secondary drying)

▶ To add a step in the secondary drying phase, click on a step with the phase Secondary drying in the content area of the *Table* tab.

⇨ The selected step number is highlighted in green.

▶ **NOTICE! The step can be inserted before or after the selected step.**
Option 1: To add a step before the selected step, click the button *[Insert before]*.
Option 2: To add a step after the selected step, click the button *[Insert after]*.

⇨ A step with the phase Secondary drying is inserted before or after the selected step.

Deleting a step

▶ To delete a step, click on the step to be deleted in the content area of the *Table* tab.

⇨ The selected step number is highlighted in green.

▶ Click the *[Delete]* button.

NOTE

The button *[Delete all]* deletes all steps except for the two steps that are set by default (primary drying and secondary drying).

Editing steps on the graph

The *Graph* tab shows the defined steps of a method as a graph. Firstly, this provides a graphical representation of the defined pressure and temperature progression for the method. Secondly, the defined steps can be edited directly in the graph view.

Navigation path

➔Method ➔Manager

▶ Navigate to the submenu *[Manager]* via the navigation path.
▶ In the content area of the submenu *[Manager]*, click the button *[Edit]*.

⇨ The *Edit* window opens.

▶ Switch to the *Graph* tab.

⇨ The set steps of the method are displayed as a graph.

- ▶ Use the buttons to change the steps for the parameters drying shelf temperature, pressure and safety pressure as required.
- ▶ Click *[OK]* to confirm your entries.

NOTE

Buttons are active if they are shown in green. Steps on the graph can be edited by first selecting the button for the desired function and then editing the settings on the graph.

The following parameters are available for editing:

Button	Meaning
Shelf temperature	To edit the parameter Shelf temperature for the individual steps of a method, click the button *[Shelf temperature]*. The corresponding curve is highlighted on the graph and the steps displayed.
Pressure	To edit the parameter Pressure for the individual steps of a method, click the button *[Pressure]*. The corresponding curve is highlighted on the graph and the steps displayed.
Safety pressure limit	To edit the parameter Safety pressure for the individual steps of a method, click the button *[Safety pressure]*. The corresponding curve is highlighted on the graph and the steps are displayed.

The following options are available for editing the parameters:

Button		Meaning
	Add step	Adds a step to the selected curve.
	Delete step	Deletes a step from the selected curve.
	Move step	Changes the position of a step in the selected curve.
	Move step horizontally	Moves a step horizontally in the selected curve.
	Move step vertically	Moves a step vertically in the selected curve.
	Phase cursor	Defines steps within a phase. ▶ To mark the steps in the secondary drying phase, press and hold the mouse button and drag the cursor to the left or right ⇨ The secondary drying phase is highlighted in pink.
	Delete all steps	Deletes all steps except for the two steps that are set by default (primary drying and secondary drying).
	Axis grid	Shows/hides time axis grid.
	Snap to grid	Active: mouse pointer snaps to grid point

4.2.6 Transferring a method from the software to a Lyovapor™ instrument

NOTE

To be able to carry out an automated freeze-drying process using methods, the methods created in the software must first be transferred to the Lyovapor™ instrument on which the process is to be carried out. A maximum of 35 methods can be stored on the instrument.

Navigation path

➔Methods ➔Transfer

Precondition:

☑ Method has been created in the Lyovapor™ software.

☑ Software is connected to the instrument.

▶ Navigate to the submenu *[Transfer]* via the navigation path.

▶ In the content area of the submenu *[Transfer]*, click on one or more methods in the list at the top that are to be transferred to the instrument.

⇨ The selection is highlighted in green.

▶ To transfer the selected method(s) to the instrument, click the button  .

⇨ The following message appears: **1 method(s) successfully transferred.**

▶ Click *[OK]* to acknowledge the message.

4.2.7 Transferring a method from a Lyovapor™ instrument to the software

Navigation path

➔Methods ➔Transfer

Precondition:

☑ Method has been created.

☑ Software is connected to the instrument.

▶ Navigate to the submenu *[Transfer]* via the navigation path.

▶ In the content area of the submenu *[Transfer]*, click on one or more methods in the list at the bottom that are to be transferred to the software.

⇨ The selection is highlighted in green.

▶ To transfer the selected method(s) to the software, click the button  .

⇨ The following message appears: **1 method(s) successfully transferred.**

▶ Click *[OK]* to acknowledge the message.

4.2.8 Importing a method

Navigation path

➔Methods ➔Manager

▶ Navigate to the submenu *[Manager]* via the navigation path.

▶ In the content area of the submenu *[Manager]*, click the button *[Import]*.

▶ Select the path from where the method(s) is/are to be imported.

▶ Confirm the path details.

⇨ The method(s) is/are imported.

4.2.9 Exporting a method

Navigation path

➔Methods ➔Manager

- ▶ Navigate to the submenu *[Manager]* via the navigation path.
- ▶ In the content area of the submenu *[Manager]*, select the method that is to be exported.
- ▶ In the content area of the submenu *[Manager]*, click the button *[Export]*.
- ▶ Select the path to where the method(s) is/are to be exported.
- ▶ Confirm the path details.

⇨ The method(s) is/are exported to the destination directory.

4.2.10 Deleting a method

Navigation path

➔Methods ➔Manager

- ▶ Navigate to the submenu *[Manager]* via the navigation path.
- ▶ In the content area of the submenu *[Manager]*, click on the method that is to be deleted.

⇨ The selected method(s) is/are highlighted in green.

- ▶ Click the *[Delete]* button.
- ▶ Select **Yes** to confirm the action in response to the confirmation question.

⇨ The following message appears: **1 method(s) successfully deleted.**

- ▶ Click *[OK]* to acknowledge the message.

4.3 Preparing the instrument

Time required: approx. 30min

Navigation path

➔ Operation ➔ Automatic

or

➔ Operation ➔ Manual

Precondition:

☑ All actions required for commissioning the instrument are completed. See operating instructions for the Lyovapor™ instrument concerned.

☑ Desired instrument is connected to the software.

☑ The instrument is in idle mode.

- ▶ Navigate to the *[Automatic]* or *[Manual]* menu via the navigation path.
- ▶ In the content area of the submenu *[Automatic]* or *[Manual]*, click the *[Start]* button under *[Conditioning]*.

⇨ The background colour of the Favourites menu turns black and the status **Idle mode** changes to Conditioning.

⇨ The temperature in the ice condenser cools to operating temperature and is shown under *[Actual]* in the *[Ice condenser]* panel.

⇨ The pump is brought up to operating temperature.

⇨ After completion of the conditioning phase, the Favourites bar shows the status **Loading** or **Unloading/Loading** and the background colour of the Favourites bar changes back to white.

4.4 Performing freeze-drying using a method

NOTE

To ensure a stable freeze-drying process, it is advisable to regularly carry out a vacuum test and/or a leak test before starting the freeze-drying process. See Chapter 4.6 “System tests”, page 48.

NOTE

In the case of continuous operation without intermediate system venting, the maximum process parameter recording time is 10 days. Thus, if that period is exceeded, a process may have multiple results files.

NOTE

The results files for a process including the conditioning and drying phases are saved on the instrument and limited to a maximum of 5. If a process is conducted without the software connected, regular transfer of the results to a computer is recommended.

4.4.1 Selecting a method

Navigation path

➔Operation ➔Automatic

Precondition:

☑ The instrument has been prepared.

☑ Desired method has been transferred to the instrument, see Chapter 4.2.6 “Transferring a method from the software to a Lyovapor™ instrument”, page 41.

▶ Navigate to the *[Automatic]* menu via the navigation path.

▶ In the content area of the submenu *[Automatic]*, click the *[Activate method]* button under *[Automatic mode]*.

⇨ The *Edit* window for Automatic mode opens.

▶ In the *[Activate method]* panel, click the arrow.

⇨ A drop-down list appears.

▶ Click the desired method to select it.

⇨ The *[Method version]* box in the *Edit* window is automatically completed.

▶ Option: Enter a name in the box *[Batch name (optional)]*.

▶ Click *[OK]* to confirm method selection and close the *Edit* window.

⇨ The boxes in the content area are completed with the selected details.

⇨ The *[Edit current method]*, *[Start]* and *[Start Manual mode]* buttons become active.

4.4.2 Starting freeze-drying

NOTE

The freeze-drying process can be started from the submenu *[Automatic]* by clicking the *[Start]* button. The process can also be started by activating Manual mode by clicking *[Start Manual mode]* and subsequently stopped by starting the venting sequence by clicking *[Start]*.

Navigation path

➔Operation ➔Automatic

If a gas is being used

Precondition:
☑ The instrument has been prepared.
☑ A method is selected.
☑ A top-mount drying rack is fitted.

▶ Load the top-mount drying rack with frozen samples.
▶ Navigate to the *[Automatic]* menu via the navigation path.
▶ In the content area of the submenu *[Automatic]*, click the *[Start]* button under *[Automatic mode]*.
▶ Make sure that the specified gas is being used.
▶ Answer **Yes** to the confirmation question.
⇨ The freeze-drying process starts.
⇨ The background colour of the Favourites menu changes to black.
⇨ The system carries out the selected method.

If a gas is not being used

Precondition:
☑ The instrument has been prepared.
☑ A method is selected.
☑ A top-mount drying rack is fitted.

▶ Load the top-mount drying rack with frozen samples.
▶ Navigate to the *[Automatic]* menu via the navigation path.
▶ In the content area of the submenu *[Automatic]*, click the *[Start]* button under *[Automatic mode]*.
⇨ The freeze-drying process starts.
⇨ The background colour of the Favourites menu changes to black.
⇨ The system carries out the selected method.

4.4.3 Changing method steps while the process is running

NOTE
The steps of a method can be adjusted while the freeze-drying process is in progress. See Chapter 4.2.5 “Setting the steps of a method”, page 37.

Only steps in the future can be changed. The step currently in progress continues to completion.

4.4.4 Switching to Manual mode

Navigation path

➔Operation ➔Automatic

Precondition:
☑ A method is selected.
☑ The Favourites bar shows the status **Automatic mode**.

▶ Navigate to the *[Automatic]* menu via the navigation path.
▶ In the content area of the submenu *[Automatic]*, click the *[Start Manual mode]* button under *[Automatic mode]*.

▶ Answer **Yes** to the confirmation question.

⇨ The status **Automatic mode** changes to **Manual**.

NOTE
For information on manual process control, see Chapter 4.5 “Performing freeze-drying manually”, page 46.

4.4.5 Cancelling sample protection

NOTE
If the sample temperature reaches the safety temperature in the primary phase before the set end time, sample protection is activated, thus suspending the freeze-drying process for as long as sample protection is active. To prevent the freeze-drying process being interrupted, sample protection must be manually cancelled as soon as it is activated.

Navigation path

➔Operation ➔Automatic

Precondition:

☑ The freeze-drying process is in the primary phase.

☑ Sample protection has been activated because the sample temperature has reached the safety temperature before the defined end time.

▶ Navigate to the *[Automatic]* menu via the navigation path.

▶ In the content area of the submenu *[Automatic]*, click the *[Cancel]* button under *[Sample protection]*.

⇨ Sample protection is aborted and the freeze-drying process continues.

4.4.6 Ending freeze-drying

Navigation path

➔Operation ➔Automatic

Precondition:

☑ The Favourites bar shows the status **Hold**.

▶ Navigate to the *[Automatic]* menu via the navigation path.

▶ In the content area of the submenu *[Automatic]*, click the *[Start Manual mode]* button.

▶ Answer **Yes** to the confirmation question.

▶ In the content area of the submenu *[Automatic]*, click the *[Start]* button under *[Aeration]*.

⇨ The system is vented.

⇨ The Favourites bar shows the status **Venting**.

▶ Wait until the Favourites bar shows the status **Unloading/Loading**.

▶ Remove the dried preparation from the top-mount drying rack.

4.5 Performing freeze-drying manually

NOTE

To ensure a stable freeze-drying process, it is advisable to regularly carry out a vacuum test and/or the leak test before starting the freeze-drying process. See Chapter 4.6 “System tests”, page 48.

NOTE

The results files for a process including the conditioning and drying phases are saved on the instrument and limited to a maximum of 5. If a process is conducted without the software connected, regular transfer of the results to the computer is recommended.

4.5.1 Starting freeze-drying

NOTE

The freeze-drying process can be aborted by starting the venting sequence by clicking *[Start]* on the submenu *[Manual]*.

Navigation path

➔Operation ➔Manual ➔Manual mode

Precondition:
☑ The instrument has been prepared.
☑ A top-mount drying rack is fitted.

▶ Load the top-mount drying rack with frozen samples.
▶ Navigate to the *[Manual]* menu via the navigation path and select the *Manual mode* tab.
▶ In the content area of the *Manual mode* tab, click the *[Edit]* button under *[Manual drying]*.
⇨ The *Edit* window opens.
▶ Set the required settings for the process parameters and click *[OK]* to confirm.
▶ In the content area of the *Manual mode* tab, click the *[Start]* button under *[Manual drying]*.
⇨ The freeze-drying process starts.
⇨ The background colour of the Favourites menu changes to black.
⇨ The system evacuates to the set pressure.

The following process parameter settings are available in the *Edit* window:

Setting	Option	Meaning
[Shelf temperature]	Enter setting	Sets the temperature of the heated shelves for the duration of the step.
[Duration]	Enter setting	Duration of freeze-drying.
[Shelf temperature gradient]	Automatically calculated value	Shows the temperature gradient for the drying shelf temperature

Setting	Option	Meaning
[Pressure zone]	Regulated	The set pressure levels are applied.
	Minimum	the maximum vacuum is applied to reach the lowest possible pressure.
[Pressure]	Enter setting	Sets a target value for the regulated pressure.

4.5.2 Changing parameters while the process is running

Navigation path

➔Operation ➔Manual ➔Manual mode

Precondition:
☑ The freeze-drying process has been started.

- ▶ Navigate to the *[Manual]* menu via the navigation path and select the *Manual mode* tab.
- ▶ In the content area of the *Manual mode* tab, click the *[Edit]* button under *[Manual drying]*.

⇨ The *Edit* window opens.

- ▶ Change the desired process parameters and click *[OK]* to confirm.

⇨ The setting is saved.

4.5.3 Endpoint determination

NOTE

Manual end point determination can only be performed on the Lyovapor™ L-300 Pro.

Navigation path

➔Operation ➔Manual ➔Manual end tests

Precondition:
☑ The process has been started.

- ▶ Navigate to the *[Manual]* menu via the navigation path and select the *Manual end tests* tab.
- ▶ In the content area of the *Manual end tests* tab, click the button *[Edit]*.

⇨ The *Edit* window opens.

- ▶ Set the required parameter settings for the pressure rise test and click *[OK]* to confirm.
- ▶ In the content area of the *Manual end tests* tab, click the button *[Start]*.

⇨ The pressure rise test starts.

⇨ After completion of the pressure rise test, the *[Status]* box shows the test result (Successful/Unsuccessful)

The following pressure rise test parameter settings are available in the *Edit* window:

Setting	Option	Meaning
[Pressure limit]	Enter setting	Pressure increase (delta p) within the programmed duration of test. Choose this value under consideration of the leak rate of the instrument itself.
[Duration]	Enter setting	Specifies the length of time for which the pressure rise test is to be carried out.

4.5.4 Ending freeze-drying

Navigation path

➔Operation ➔Manual ➔Manual mode

Precondition:
☑ The preparation is dry.

- ▶ Navigate to the *[Manual]* menu via the navigation path and select the *Manual mode* tab.
- ▶ In the content area of the *Manual mode* tab, click the *[Start]* button under *[Aeration]*.
- ▶ Select **Yes** to confirm the action in response to the confirmation question.

⇨ The system is vented.
⇨ The Favourites bar shows the status **Venting**.

- ▶ As soon as the Favourites bar shows the status **Unload/Load**, remove the dried preparation from the drying rack.

4.5.5 Go to standby

Precondition:
☑ The freeze-drying process has ended. See Chapter 4.5.4 “Ending freeze-drying”, page 48.

- ▶ In the content area of the *Manual mode* tab, click the *[Start]* button under *[Switch to Idle mode]*.

⇨ The instrument is shutting down.
⇨ The Favourites bar changes its background colour to black and initially shows the status **Shutting down** before subsequently changing the status to **Defrosting**.
⇨ After completion of the **Defrosting** phase, the Favourites bar shows the status **Idle mode** and the background colour of the Favourites bar changes back to white.

4.6 System tests

4.6.1 Performing vacuum test

The vacuum test checks the performance capacity of the vacuum system.

Time required: max. 10 min

Navigation path

➔Operation ➔ System tests ➔Vacuum test

Precondition:
☑ The instrument has been prepared.
☑ A top-mount drying rack is fitted.
☑ The top-mount drying rack does not contain a sample.

▶ Navigate to the *[System test]* menu via the navigation path and select the *Vacuum test* tab.

▶ In the content area of the *Vacuum test* tab, click the button *[Edit]*.

⇨ The *Edit* window opens.

▶ In the box *[Ice condenser pressure]*, enter a required setting for the vacuum to be achieved.
▶ In the *[Time limit]* box, enter a required time within which the vacuum is to be reached.
▶ Click *[OK]* to confirm your entries.
▶ In the content area of the *Vacuum test* tab, click the button *[Start]*.

⇨ The vacuum test starts.

⇨ The test status in the content area of the *Vacuum test* tab is shown as **Running**.

⇨ The Favourites menu changes its background colour to black and shows the status **Vacuum test**.

⇨ If the vacuum pressure is not below 500mbar after 30s, the vacuum test automatically aborts.

⇨ After completion of the vacuum test, the test status in the content area of the *Vacuum test* tab shows whether the test has been passed or failed.

NOTE
If the system test is not passed, refer to Chapter 5.2 “Troubleshooting after failed system test”, page 55

4.6.2 Performing leak test for L-200 Pro / L-250 Pro

The leak test checks the vacuum system for possible leaks.

Time required: 45 min

Navigation path

➔Operation ➔ System tests ➔ Leak test

Precondition:
☑ The instrument has been prepared.
☑ A top-mount drying rack is fitted.
☑ The top-mount drying rack does not contain a sample.

▶ Navigate to the *Leak test* tab via the navigation path.

▶ In the content area of the *Leak test* tab, click the button *[Edit]*.

⇨ The *Edit* window opens.

▶ From the drop-down list for *[Test scope]*, select *Complete system*.
▶ In the *[Pressure]* box, enter a required setting for the vacuum.
▶ In the *[Heated shelves]* box, switch shelf heating on or off.
▶ If the shelf heating is switched on, enter the drying shelf temperature in the box *[Drying shelf temperature setting]*.

▶ In the *[Volume]* box, enter the actual volume of the components to be tested.

The volume of the system is calculated from the volume of the ice condenser and the top-mount drying rack.
The following options are available:

Option		Volume
Full system (top-mount drying rack and ice condensers)	Manifold drying rack	13.64 L
	Acrylic drying chamber (with 4 drying shelves)	36.46 L
	Acrylic drying chamber (with 6 drying shelves)	43.41 L

▶ Click *[OK]* to confirm your entries.

▶ In the content area of the *Leak test* tab, click the button *[Start]*.

⇨ The leak test starts.

⇨ The test status in the content area of the *Leak test* tab is shown as **Running**.

⇨ The Favourites menu changes its background colour to black and shows the status **Leak test**.

⇨ After completion of the leak test, the test status in the content area of the *Leak test* tab shows whether the test has been passed or failed.

⇨ The leak test is passed if the measured leakage rate is less than the pre-set rate of 10.10 mbar•L/h.

NOTE

If the system test is not passed, refer to Chapter 5.2 “Troubleshooting after failed system test”, page 55

4.6.3 Performing leak test for L-300 Pro

The leak test checks the vacuum system for possible leaks.

Time required:	45 min

Navigation path

➔Operation ➔ System tests ➔Leak test

Precondition:
☑ The instrument has been prepared.
☑ A top-mount drying rack is fitted.
☑ The top-mount drying rack does not contain a sample.

▶ Navigate to the *[System tests]* menu via the navigation path and select the *Leak test* tab.

▶ In the content area of the *Leak test* tab, click the button *[Edit]*.

⇨ The *Edit* window opens.

▶ From the drop-down list for *[Test scope]*, select the component to be tested: Ice condenser 1, Ice condenser 2, Complete system.
▶ In the *[Pressure]* box, enter a required setting for the vacuum.
▶ In the *[Heated shelves]* box, switch shelf heating on or off.
▶ If the shelf heating is switched on, enter the drying shelf temperature in the box *[Drying shelf temperature setting]*.
▶ In the *[Volume]* box, enter the actual volume of the components to be tested.

The volume of the system is calculated from the volume of the ice condenser and the top-mount drying rack.
The following options are available:

Option		Volume
Ice condenser 1		24.4 L
Ice condenser 2		24.4 L
Top-mount drying rack	Acrylic drying chamber (with 4 drying shelves)	47.2 L
	Acrylic drying chamber (with 6 drying shelves)	54.1 L
Full system (top-mount drying rack and ice condensers)	Without drying rack	33.5 L
	Acrylic drying chamber (with 4 drying shelves)	56.3 L
	Acrylic drying chamber (with 6 drying shelves)	63.2 L

- ▶ Click *[OK]* to confirm your entries.
- ▶ In the content area of the *Leak test* tab, click the button *[Start]*.

⇨ The leak test starts.

⇨ The test status in the content area of the *Leak test* tab is shown as **Running**.

⇨ The Favourites menu changes its background colour to black and shows the status **Leak test**.

⇨ After completion of the leak test, the test status in the content area of the *Leak test* tab shows whether the test has been passed or failed.

⇨ The leak test is passed if the measured leakage rate is less than the pre-set rate of 10.10 mbar•L/h.

NOTE

If the system test is not passed, refer to Chapter 5.2 “Troubleshooting after failed system test”, page 55

5 Help

5.1 Status and error messages

Below is a list of the possible status and error messages that may be displayed when using the Lyovapor™ software:

Error message	Possible cause	Solution
Another user locks the active method storage on the instrument. Please try again.	Another user is currently editing the active method.	Wait until the other user has finished editing the method.
License import unsuccessful.	Problem with the licence.	Request a new licence file from BUCHI Software Support.
An unknown error has occurred.	Internal error: Unexpected error	Please contact BUCHI Software Support.
Error at audit trail initialization.	Error when initialising the log. Incorrect database connection file. No database connection.	Restart the software and try again. Restart the PC and try again. Check whether the service "SQL Server (BUCHISQL2014)" has been activated.
The size of the database "{0}" has reached the warning limit of {1}%!	Database size monitoring activated.	Create a new database: ▶ Lyovapor software: Export methods. ▶ Close the Lyovapor software ▶ BUCHI Database Manager: Create a backup of the database "LyovaporRecords". ▶ BUCHI Database Manager: Create a new "LyovaporRecords" database. ▶ Start Lyovapor software ▶ Import methods
An error occurred while reading from database table "{0}"	Read error: No database connection, Table not present	Restart the software and try again. Restart the PC and try again.
An error occurred while reading from the database.	General read error	Restart the software and try again. Restart the PC and try again.
An error occurred while writing to the database table "{0}".	Write error: No database connection, Table not present	Restart the software and try again. Restart the PC and try again.
Error during method activating on the instrument.	Internal error: Communication problem	Reconnect to the instrument and try again.
Error during uploading the active method.	Internal error: Communication problem	Reconnect to the instrument and try again.
An error occurred at deleting the method data with name "{0}"!	Method already deleted by another user.	Update the data content by navigating to another menu item and then back again.

Error message	Possible cause	Solution
An error occurred at deleting process data!	Results already deleted by another user. Error when deleting from database (no database connection).	Update the data content by navigating to another menu item and then back again.
There is not enough disk space.	Insufficient storage space available	Select another drive with sufficient free space for the export.
Error during saving the active method.	Internal error: Communication problem	Reconnect to the instrument and try again.
Error at uploading instrument data: {0}	Internal error: General error	Reconnect to the instrument and try again.
Error at uploading instrument data: {0}	Internal error: Communication problem	Reconnect to the instrument and try again.
An error occurred while exporting!	General error	Check the write permissions for the selected directory. Choose a drive with sufficient free space for the export.
Could not find the help file.	Help file missing	Repair the installation.
An error occurred while reading an image file.	Logo image file could not be read. File may possibly be corrupted.	Select an image file of the type JPG or PNG.
An error occurred while importing!	General error	File to be imported may possibly not be complete.
The process time overlaps a modified method step! The editor will be closed, you changes will not be saved.	The method editor was left open for so long that the process time reached an edited step.	Close the method editor and reopen it. Make the changes and save them.
A new step cannot be added in the past!	New method steps can only be added to a method currently in progress provided they are in the future.	Only attempt to add method steps after the current step.
The method name "{0}" already exists!	The same method name cannot be used more than once.	Use a method name that does not already exist.
Method "{0}" version {1} already exists.	Method already exists on the instrument.	No action necessary, as the method is already on the instrument. The method can be used on the instrument.
It's not allowed to overwrite an existing method "{0}" with state "{2}". Existing method in database: Version: {1} State: {2} Last modified: {3} Method to import: Version {4} State: {5} Last modified: {6}	Importing a method that is currently being edited is not possible.	Wait until the other user has finished editing the method. Then try again to transfer the method from the instrument to the PC.

Error message	Possible cause	Solution
The method with the name "{0}" does not exists!	Another user has already deleted the method.	Update the data content by navigating to another menu item and then back again.
The running step or a step in the past cannot be deleted!	It is only possible to delete steps from a method currently in progress provided they are in the future.	Only attempt to delete steps that are in the future.
The method storage on the instrument is full. The maximum number of methods on the instrument are {0}.	Method memory on the instrument is full.	Delete unused methods from the instrument in order to be able to transfer new methods.
Method "{0}" version {1} cannot be transferred to the instrument, because the instrument type does not match: Connected instrument type: {2} {3} Configured instrument type in method: {4} {5} OK: skip this method Cancel: abort the method transfer	Device type must match the device type in the method.	Only select methods that match the instrument type connected.
Could not find the Buchi PDF viewer. Please install the PDF viewer first.	BUCHI PDF Viewer is not installed.	Repair the installation.
You have no permission for this function. Please contact your administrator.	No authorisation exists.	Request your administrator to set up the required permissions.
There is no printer installed, please install a printer and retry.	No printer installed in Windows.	Install printer in Windows and restart the operation.
The configured printer '{0}' does not exists!	Configured printer is no longer available in Windows.	Reconfigure the printer settings.
The process data with sample name "{0}" does not exists!	Results already deleted by another user.	Update the data content by navigating to another menu item and then back again.
An error occurred while saving the report.	Hard disk full	Choose a drive with sufficient free space for saving the results.
	No write authorisation	Check the write permissions for the selected directory.
The identical result "{0}" already exists in the database!	Same results already exist.	No action required as the results already exist.
Error in state machine!	Internal fault in the state machine.	Reconnect to the instrument and try again.
The file contains no method data.	The file contains no method data.	Select a different file for import.

Error message	Possible cause	Solution
The file contains no result data.	File selected for import contains the wrong data.	Select a different file for import.
Your license is invalid. To continue using the software, please register the software. Click OK to exit.	Invalid licence	Request a licence from BUCHI Software Support.

5.2 Troubleshooting after failed system test

If the vacuum test and/or the leak test is failed, see below for the following possible causes and actions:

Possible cause	Action
Top-mount drying rack not correctly fitted	Fit the top-mount drying rack correctly.
300 mm dia. O-rings dirty	Wipe down the 300 mm O-rings with a damp cloth.
300 mm dia. O-rings damaged	Inspect 300 mm O-rings and replace as necessary.
KF clamps not closed	Close the KF clamps.
KF seals dirty	Wipe down the KF seals with a damp cloth.
KF seals damaged	Inspect KF seals and replace as necessary.
Pump oil dirty	Service according to manufacturer's instructions.
The pump connected is not delivering sufficient performance	Carry out vacuum test with a different vacuum pump.
There is remaining water inside the system.	Wipe out the system thoroughly with a dry cloth.

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