English

Liquid Handling Station | Automating methods

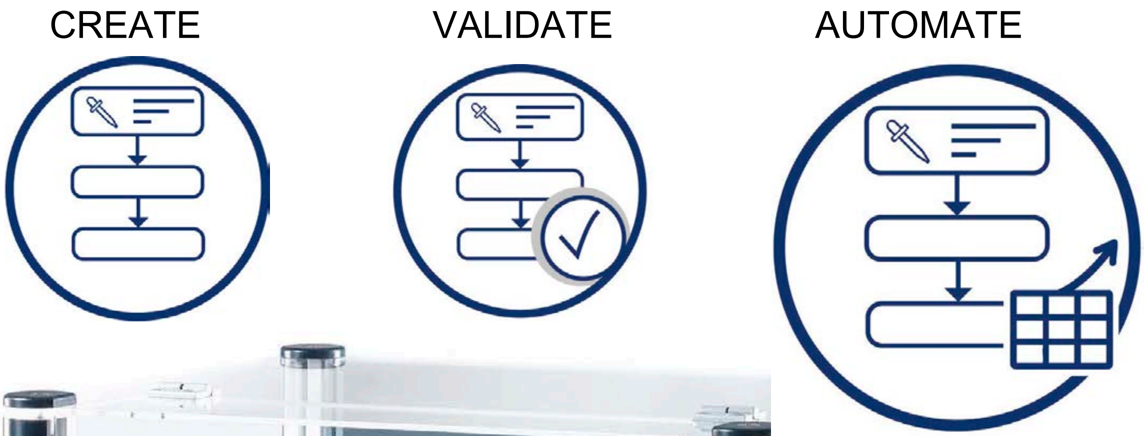

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Table Import

Technical Note

Contents

1. Automate methods

A method determines the arrangement of the labware on the work table of the Liquid Handling Station and the detailed execution of pipetting steps by the Liquid Handling Station. As of **software version V4.4.7**, you can dynamically update your methods by importing information at the start of the method, thus automating the method. Use a spreadsheet program such as Microsoft Excel to easily generate and provide data for the Liquid Handling Station.

	A	B	C	D	E	F	G
1	#ID: Transfer culture medium						
2	SourcePlate	SourceWell	DestinationPlate	DestinationWell	Volume		
3	Reaktionsgefäße 1	B1	Deep-Well Platte	A1	40		
4	Reaktionsgefäße 1	B1	Deep-Well Platte	A2	80		
5	Reaktionsgefäße 1	B1	Deep-Well Platte	A3	120		
6	Reaktionsgefäße 1	B1	Deep-Well Platte	A4	160		
7							
8							

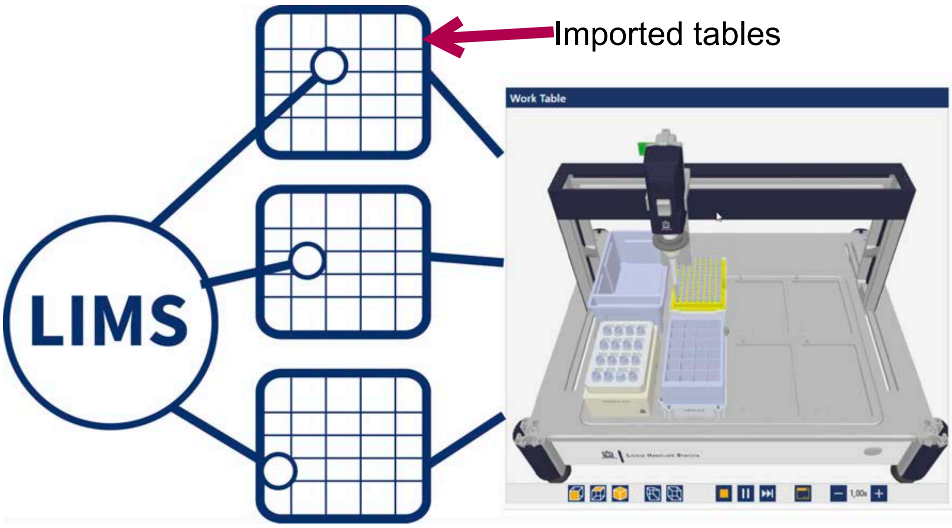
Test planing | Source | Transfer cell cultur | **Transfer culture medium** | Water Fill-up

When does dynamic method execution make sense?

+ The LIMS (Laboratory Information Management System) provides sample tracking and labeling. The executed method is used as evidence in the LIMS.
+ You are planning a series of tests with the same work table configuration in which labware with different volumes is to be filled or transferred successively. The test series is documented.
+ Their methods are very similar or similar. You want to increase throughput in the lab. Excel integration allows scientists to quickly adjust and optimize methods, such as logarithmic dilution series.
+ You can automate a method with Excel without programming knowledge. Excel's formula functions minimize calculation and typing errors. Excel also allows you to quickly adjust the methods, as is often the case with research projects.

How can a method be automated?

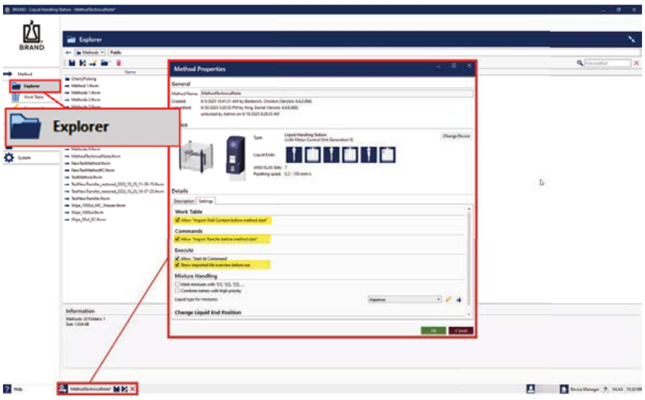
Automating a method only makes sense if it is valid and works reliably. This replaces the variable contents of the method (for example, volumes, transfer commands) with the imported sources. This procedure is described below.



From method to automated method – a process

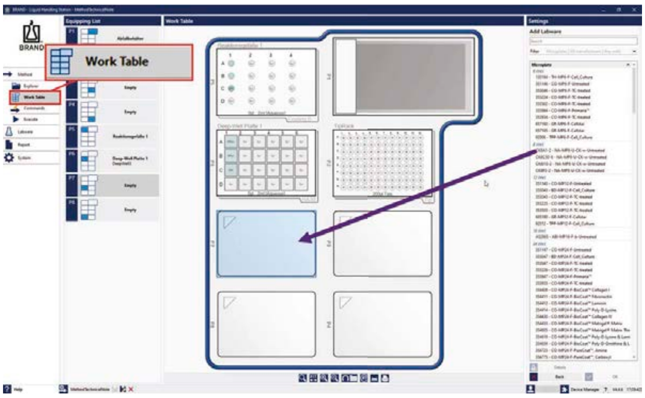
Create method

First, create the required method. Ideally, this method is very well suited to its later application, especially in terms of pipetting parameters, tip usage, liquid end and transfers. You can also use existing methods for automation. In this case, continue reading from *Validate Method*.



1: Create method

After you start the software, you create a new method from Explorer. In the method properties, for example, you enable the *Allow "Import Well Content before method start"* and *Allow "Import Transfer before Method Start"* options to allow Excel import.

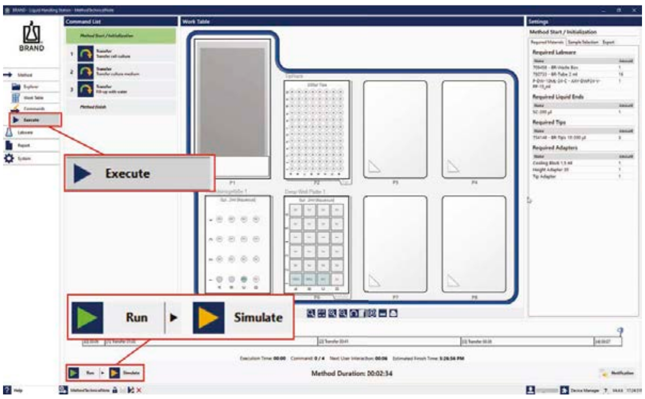


2: Labware on the work table

In this step, you determine which labware you want to use for the method and which fluid is in the labware at the beginning of the method.

3: Set up commands of the method.

Select the appropriate commands from the command list. Important is the transfer command that allows you to transfer liquids from a source labware to a target labware. In the details of the command, set additional pipetting parameters. In addition, the command types *Wait* | *Mix* | *Pause* | *Pause* are also *External Devices* available.



4: Run or simulate the method

You can now simulate the method or run it directly with the Liquid Handling Station connected. In both cases, you will be shown the required labware and tip consumption. The method flow prompts you to use the required liquid end.

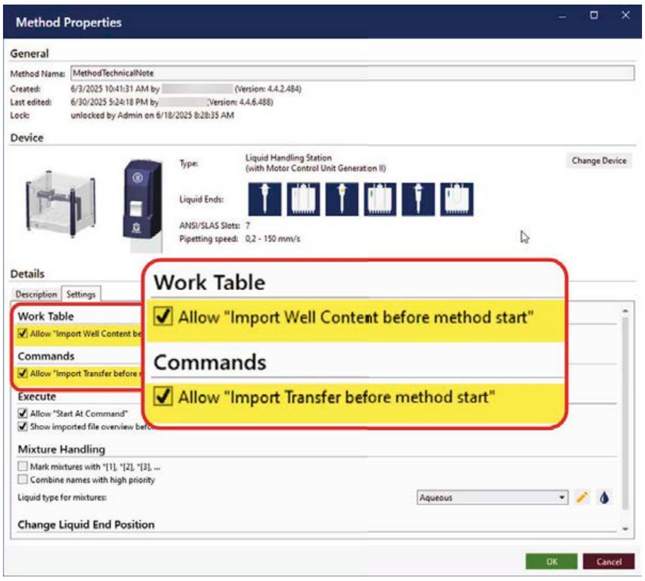
Validate the method

Run the method and check the result. Standard procedures that describe validation may already exist in your lab.

The aim of the validation is that the results of the method are reliable and reproducible. A method is valid if you run it repeatedly and do not need to make any further adjustments. It is not valid if the result depends on changes before and during the method.

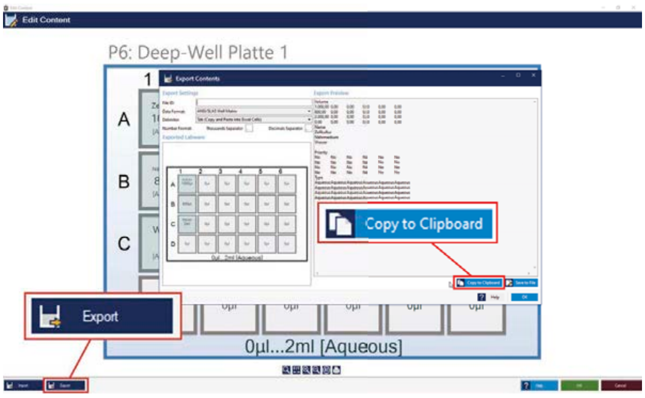
Automate the method

In this step, you replace manual entry of volumes and transfers of the method with imported values outside the software. The imported values may have been manually filled or calculated outside the Liquid Handling Station, or they may be from a LIMS.



1: Activate the import function

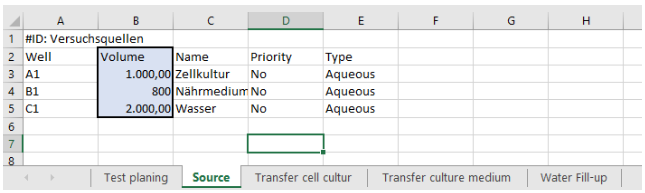
Enable the *Allow "Import Well Content before method start"* and *Allow "Import Transfer before Method Start"* options in the method properties.



2: Automate Labware

To work with the import function, first get the correct data format from the Liquid Handling Station software: Click the Labware and select *Edit Well Content*. Then click the *Export* button and copy the values to the clipboard.

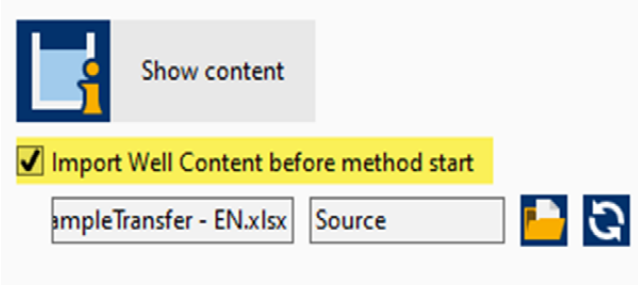
You can export the data format ANSI/SLAS and List for editing in spreadsheet programs. Choose the format you prefer to work with.



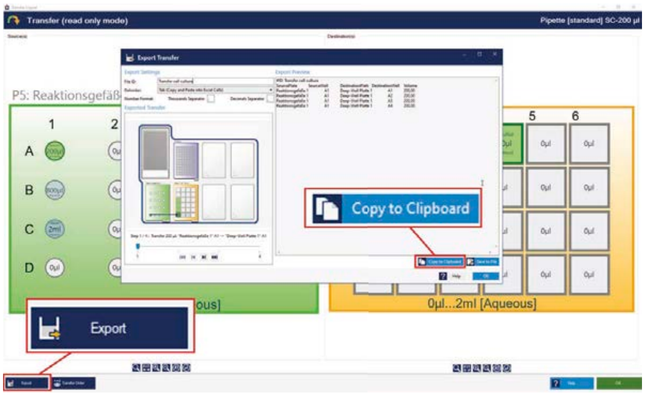
	A	B	C	D	E
1	#ID: Versuchsquellen				
2	Well	Volume	Name	Priority	Type
3	A1	1.000,00	Zellkultur	No	Aqueous
4	B1	800	Nährmedium	No	Aqueous
5	C1	2.000,00	Wasser	No	Aqueous

Insert the clipboard data into a new Excel spreadsheet and name it meaningfully.

Adjust the values (e.g. name, volume, LiquidType) in Excel, e.g. delete rows that are no longer required.

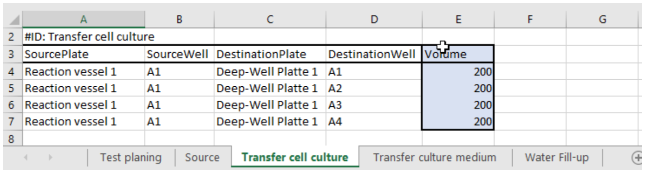


To import the table values, select the Labware location and enable the *Import Well Content before method start* option. In the *File import settings* dialog, you can select the Excel file and the corresponding spreadsheet.
In the appendix you will also find a detailed description of the *File import settings*, including how to generate a sample template for Labware or Transfers.



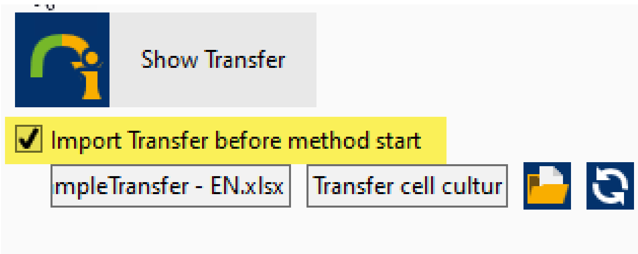
3: Automate transfer commands

Since you have already defined the transfers in the method, you can also insert them into an empty spreadsheet and customize them in Excel.

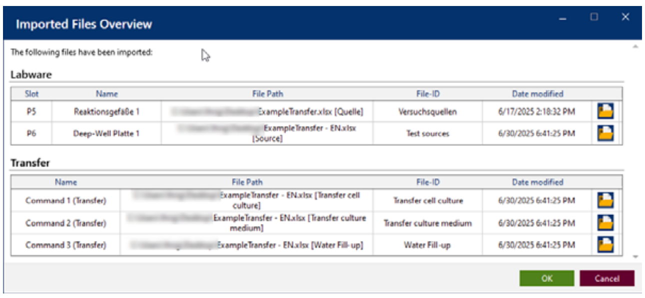


	A	B	C	D	E
2	#ID: Transfer cell culture				
3	SourcePlate	SourceWell	DestinationPlate	DestinationWell	Volume
4	Reaction vessel 1	A1	Deep-Well Platte 1	A1	200
5	Reaction vessel 1	A1	Deep-Well Platte 1	A2	200
6	Reaction vessel 1	A1	Deep-Well Platte 1	A3	200
7	Reaction vessel 1	A1	Deep-Well Platte 1	A4	200
8					

Define the transfers, for example by changing the source and target wells or the transfer volume.



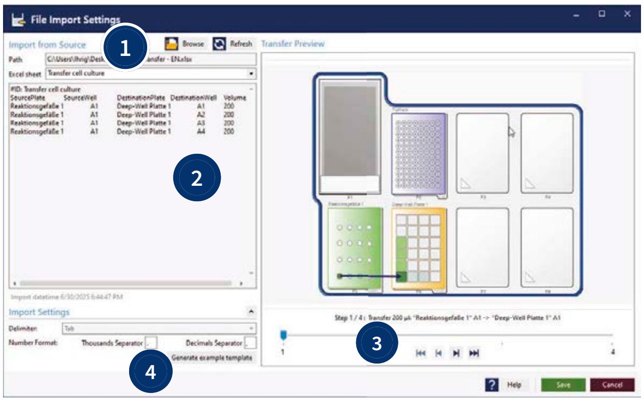
Select the transfer command and activate the *Import Transfer before method start* option.
In the *File import settings* dialog, you can select the file and the corresponding spreadsheet.
In the appendix you will also find a detailed description of the *File import settings*, including how to generate a sample template for Labware or Transfers.



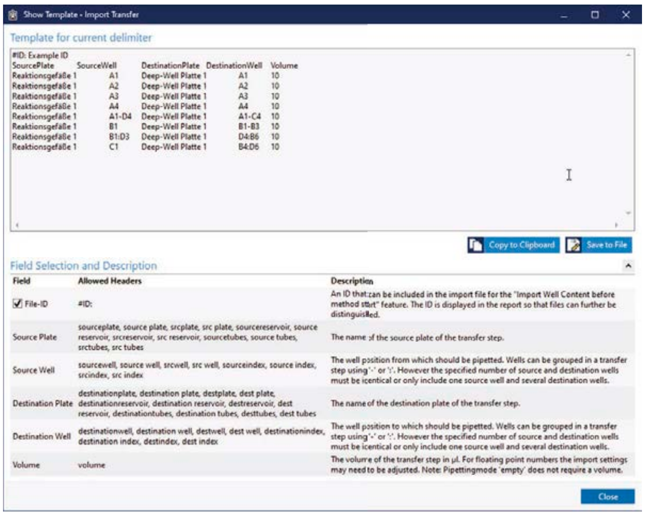
4: Run Method

Your method is automated. When the method is started, all linked files are read in and displayed to the user.
Select the *Execute* menu to start or simulate the method. In this menu, you can also lock the method and optionally save it with a password. Even if methods are locked, the latest data from your Excel file is automatically imported before each method run.

File import settings



In the *Import from Source* area, select the import file (1) and the corresponding spreadsheet that matches the Labware or command. The contents of the selected table sheet are displayed in the preview (2). In the *Transfer preview* area (3), you can view and verify the import.



Using the *Generate example template* button, you can generate a sample template for the labware or transfers using a separate dialog.
The software generates the data format based on the set values and the selected delimiters (4).
You can either copy the template to the clipboard (for use in Excel) or save it directly to a .txt/.csv file.
In the lower part of the dialog, you will find a detailed explanation of the individual rows and columns of the data format. You will learn how, for example, you can associate a unique number (e.g. an order number) with the method by assigning the file ID.

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