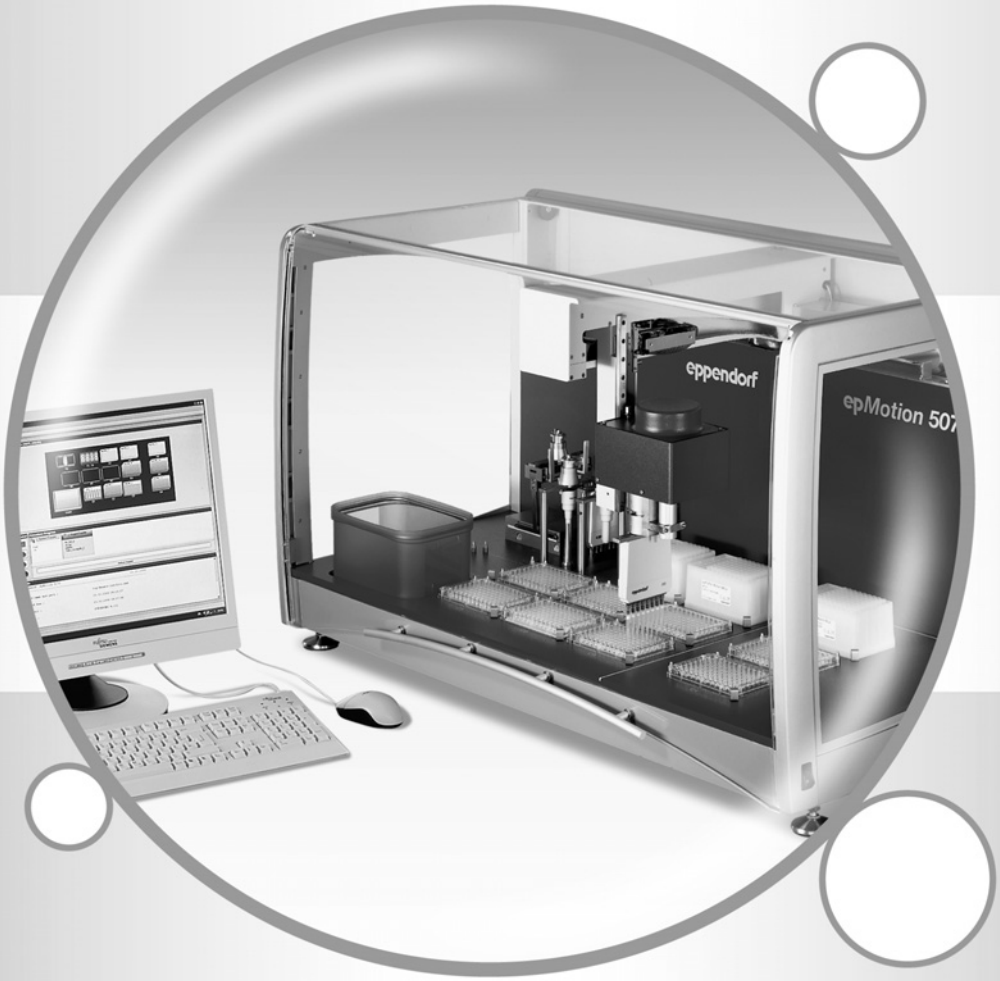

ep*Motion*® 5075 with integrated PC and epBlue

Operating manual

epBlue Version 10

123
Register
your instrument!
www.eppendorf.com/myeppendorf
myeppendorf

eppendorf

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5075 900.807-06/0311

epBlue Version 10

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1 User instructions

1.1 Using this manual

NOTICE!

Material damage due to incorrect use.

- Only use the product for its intended purpose as described in the operating manual.
- Ensure adequate material resistance when using chemical substances.
- In case of doubt, contact the product manufacturer.

- Before using the epMotion 5075 for the first time, please read the operating manual.
- Please view this manual as part of the product and keep it somewhere easily accessible.
- When passing on the device, always enclose the operating manual.
- If this manual is lost, please request another one. The current version of the operating manual can be found on our website at www.eppendorf.com.

1.2 Danger symbols and danger levels

1.2.1 Hazard icons

	Biohazard		**Explosion**
	Electric shock		**Hot surface**
	Hazard point		**Material damage**

1.2.2 Degrees of danger

The degree of danger is a part of a safety note and distinguishes the possible results of non-observance from each other.

DANGER	*Will* lead to severe injuries or death.
WARNING	*May* lead to severe injuries or death.
CAUTION	May lead to light to moderate injuries.
NOTICE	May lead to material damage.

1.3 Symbols used

Depiction	Meaning
▸	You are requested to perform an action.
1. 2.	Perform these actions in the sequence described.
•	List.
Text	Terms and key names from the software.
ⓘ	References useful information.

1.4 Abbreviations used

DWP	Deepwell plate
epT.I.P.S.	**ep**pendorf **T**otally **I**ntegrated **P**ipetting **S**ystem
LH	Liquid Handling
MC	Mastercycler
MTP	Micro test plate
PCR	Polymerase Chain Reaction
VAC	Vacuum

1.5 Glossary

A

Administrator A user with special rights. Configuration settings and several system settings are primarily reserved for the administrator. The administrator has a special PIN for logging in.

C

Command Describes a step in a method including all the parameters required for optimum execution of this procedure.

Comment The **Comment** command allows you to enter a comment line.

D

Dilute The **Dilute** command is a modified **Sample Transfer** command to make it easier for you to perform dilution series. A defined volume is transported from one well to the next several times by means of pipetting.

E

Exchange The **Exchange** command allows you to exchange two labware items on the worktable manually.

F

Filling volume The maximum filling volume of a tube or well at which removal or transport of the tube, rack or plate is still possible (transport only in the case of the epMotion 5075).

H

Height Adapter The Height Adapter is used for locating very short labware which is positioned next to tall labware (e.g., reservoir rack) on the worktable. The Height Adapter reduces travel distances and thus cycle times.

L

Labware A general term for racks, plates, tips, etc., that can be positioned on the worktable. The administrator specifies which labware can be used by selecting labware that is available in the software. The most current labware version can be viewed on the homepage www.epMotion.com.

Location The position of a plate, tips or a rack on the worktable. 4 locations are available on the epMotion worktable. 3 park positions are also shown on the worktable.

Login and logout Login and logout on the control panel; only one user can be logged in.

M

Method Saved sequence for equipping the surface (worktable) for the method start and the required procedures for the epMotion.

Mix The **Mix** command allows you to mix liquids in a tube.

MMC™ MultiMediaCard™; storage medium or memory card. It is used for the data transfer from or to a PC with Windows 98® or higher. The data on the PC is read in using a USB card reader. The USB card reader is a part of the delivery package.

Module racks The temperature-controlled module racks can be equipped with tubes in various models. Using an adjusting pin, the tubes can be positioned at five different heights in the module racks. Up to seven module racks can be positioned in a reservoir rack.

N

Number of Samples The **Number of Samples** command is used to specify how many samples should be processed in the subsequent steps of a procedure.

P

Pattern Distribution pattern; specification of the aspiration and dispensing positions within a dispensing command. With automatic pattern detection, patterns can be defined as simple standard patterns or free patterns. Patters are direction-dependent in x-direction and y-direction (e.g., from left to right or from right to left).

PCR clean PCR clean is an Eppendorf AG purity standard for disposables. Products labeled with PCRclean are certified free of human DNA, DNase, RNase and PCR inhibitors. A batch-specific certificate can be downloaded from our homepage www.eppendorf.com.

Pool The **Pool** command is used to transfer liquids from several source tube positions to destination tube positions.

Pool One Destination The **Pool One Destination** command is used to transfer liquids from several source tube positions to a destination tube position.

Procedure List of commands in chronological order of execution.

R

Rack Mount for tubes or pipette tips.

Reagent Transfer The**Reagent Transfer** command is used to transfer a liquid from one source tube to one or more positions of a destination tube.

Reservoir The 30 mL and 100 mL reservoirs (pans, tubs) for supplying reagent are suspended in a reservoir rack (max. 7 reservoirs per rack). Reservoirs with a capacity of 300 mL or 400 mL are placed in the location without a reservoir rack.

S

Sample Transfer The **Sample Transfer** command is used to transfer several liquids from various positions of one source tube to several positions of a destination tube.

Source and destination Source and destination tube. In the **Sample Transfer** or **Reagent Transfer** commands either a source tube (source) or a destination tube (destination) is selected from a location occupied by labware.

T

Thermoadapter The thermoadapter is for mounting a plate (depending on thermoadapter PCR or DWP). Thermoadapters can be passively temperature controlled. Thermoadapters and plates are not a fixed combination.

Thermoblock Metal body for combination with PCR plates and PCR tubes. Thermoblocks can be passively temperature controlled. In the software, thermoblocks are pre-configured units of a PCR plate and thermoblock. Thermoblocks are always placed on the worktable together with a PCR plate.

Thermorack Rack with a metal body. For smaller tubes (e.g., Eppendorf Safe-Lock Tubes for 0.5 ,1.5 mL or 2 mL), a temperature-controlled thermorack with a lid holder and 24 positions can be used.

Tips epT.I.P.S. Motion; pipette tips. Only epT.I.P.S. Motion can be used on the epMotion. Tips with or without filter are used. epT.I.P.S. Motion with filter are PCR clean. Pipette tips are delivered ready-for-use in PP racks.

Tool Dispensing tool. 6 different dispensing tools can be used as alternatives.

Tubes Individual tubes that can be placed in a rack.

U

User Intervention The **User Intervention** command is used to insert steps in your method which the user has to execute manually.

W

Wait The **Wait** command inserts a pause before the next command.

Working volume Recommended working volume. Up to the working volume, liquids can be dispensed in a tube or well with various liquid types with minimal contamination.

Worktable Graphic display of the items equipped (tips, racks, plates ...) on the surface at the start of a method. If labware is stacked at a location (e.g., height adapter and micro test plate), the stack is correspondingly indicated in the worktable display.

2 Product description

2.1 Main illustration

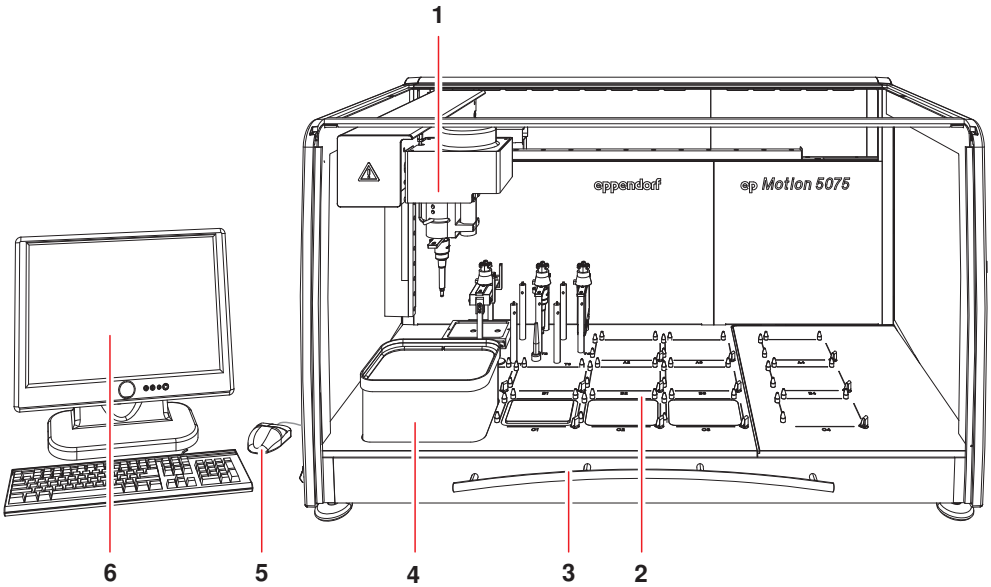


Fig. 1: Front view of the epMotion 5075

1 Carrier	**2 Worktable**
3 Front hood	**4 Waste basket**
5 Mouse	**6 Monitor**

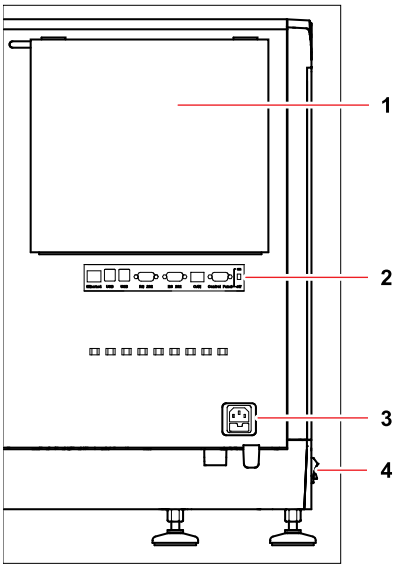


Fig. 2: Section of the rear view of the epMotion 5075

1 PC	**2 Interfaces** (see p. 183)
3 Mains connection	**4 Mains connection**

Only connect devices to the interfaces that meet the IEC 950/EN 609650 (UL 1950) standards.

2.2 Delivery package

The following accessories for the **epMotion** are included in the standard scope of delivery:

Quantity	Order No. (International)	Order No. (North America)	Description
1	5075 753.006	960002016	**Waste container**
1	–	–	**Optical sensor**
1	–	–	**Power cable** Compatible to the country where the order was placed or determined
1	5075 900.807	-	**Operating Manual epMotion 5075 with integrated PC**
1	–	–	**Tool for transport safety device**

The accessories for the **epMotion 5075 LH** are expanded by the following:

Quantity	Order No. (International)	Order No. (North America)	Description
1	5075 000.750	960020101	**Automated pipetting system epMotion 5075 LH with integrated PC** as 5075 000.008 plus integrated industrial PC, keyboard and mouse

The accessories for epMotion 5075 VAC are expanded by the following:

Quantity	Order No. (International)	Order No. (North America)	Description
1	5075 000.768	960020202	**Automated pipetting system epMotion 5075 VAC with integrated PC** as 5075 000.016 plus integrated industrial PC, keyboard and mouse
1	–	–	**Reservoir 400 mL**
1	5075 784.009	960002253	**VAC frame 1**
1	5075 778.009	960002237	**Vac frame holder**
1	5282 000.018	960002270	**Gripper**

The accessories for **epMotion 5075 MC** are expanded by the following:

Quantity	Order No. (International)	Order No. (North America)	Description
1	5075 000.776	960020303	**Automated pipetting system epMotion 5075 MC with integrated PC** as 5075 000.032 plus integrated industrial PC, keyboard and mouse
1 or	5341 000.108 5341 000.124	- 950010029	**Mastercycler ep gradient** with motorized lid 230 V / 50 - 60 Hz 115 V / 50 - 60 Hz
1 or	5345 000.102 5345 000.129	- 950010045	**Mastercycler ep gradient S** with motorized lid 230 V / 50 - 60 Hz 115 V / 50 - 60 Hz
1 or	5344 000.109 5344 000.125	- 950010061	**Mastercycler ep 384** with motorized lid 230 V / 50 - 60 Hz 115 V / 50 - 60 Hz

The accessories for epMotion 5075 TMX are expanded by the following:

Quantity	Order No. (International)	Order No. (North America)	Description
1	5075 000.784	960020404	**Automated pipetting system epMotion 5075 TMX with integrated PC** as 5075 000.733 plus integrated industrial PC, keyboard and mouse

A detailed overview of the accessories and the article numbers can be found separately(see *Accessories on p. 177)*.

2.3 Features

With epMotion 5075 you execute dispensing processes automatically. The PC with epBlue software is used to control the epMotion 5075.

The epMotion 5075 can be supplied with a variety of dispensing tools which are inserted automatically. These dispensing tools and the appropriate pipette tips in each case (epT.I.P.S. Motion) can be used to dispense quantities of liquid in the volume range from 1 µL to 1000 µL.

The epMotion 5075 is available in the following versions:

- Liquid Handling (LH)
- Vacuum Unit (VAC)
- Thermomixer (TMX)
- Mastercycler (MC)

Also refer to the operating manual of the industrial PC and the keyboard.

2.3.1 Principle of operation

The liquid is samples from the source tube in pipette tips, transported and deposited in the destination tube.

On request, an optical sensor automatically checks the correct selection and positioning of tubes, available supplies and the position of pipette tips in the rack, as well as liquid level in some tubes.

With the aid of predefined commands, you can create and edit simple or complex dispensing operations yourself and combine these into methods. In the process, you specify in the software, among other things, the source location and destination location as well as the desired dispensing or transport pattern.

The epMotion 5075 VAC is additionally equipped with a complete vacuum unit. This system is designed for the processing of vacuum-based high-throughput systems for nucleic acid purification in 96-well format, for example.

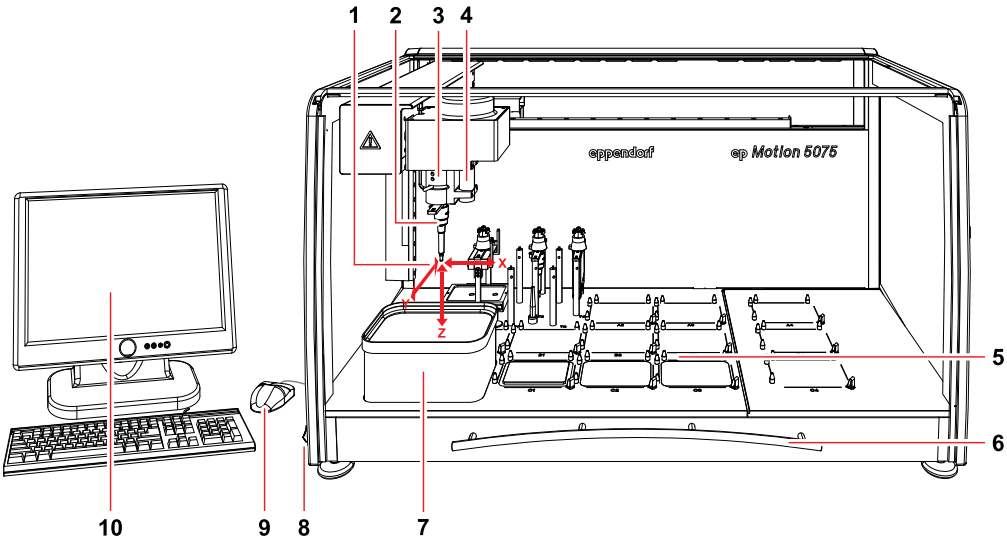
epMotion 5075 MC is equipped with a Mastercycler ep. Among other things, this system allows fully-automatic sample preparation and subsequent amplification in the Mastercycler ep.

For further information, go to www.epMotion.com

2.4 Overview of hardware and labware

Familiarize yourself with the epMotion 5075 and the labware prior to first use.

2.4.1 Hardware



1	**Directions of movement of the carrier**	2	**Dispensing tool**
3	**Carrier**	4	**Optical sensor**
5	**Locations** A and B locations for labware, C locations optional for thermal modules, T locations for dispensing tools and gripper (optional). Depending on the variant, locations for vacuum unit and Vac Frame or the Mastercycler ep (see p. 13).	6	**Front hood** Can be pushed up to open the inner space.
7	**Waste container (standard)** The waste container can be autoclaved; can be washed in a dishwasher.	8	**Mains switch** For switching on and off.
9	**Mouse**	10	**PC monitor and keyboard.**

2.4.1.1 Worktable

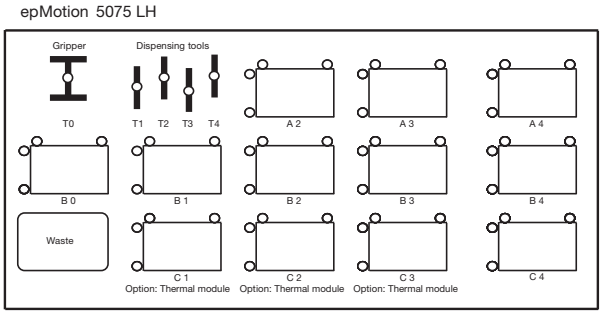
The locations on the worktable differ depending on the variant supplied.

The locations for dispensing tools, gripper and thermal modules are identical for all variants:

- Locations T1 to T4 are provided for dispensing tools which you can position in any sequence. The locations of the dispensing tools are determined automatically following the start of a method. Determination starts at T1.
- Position the gripper and the gripper holder at location T0.
- Up to three locations (C1, C2, C3) can also be equipped with a thermal module.

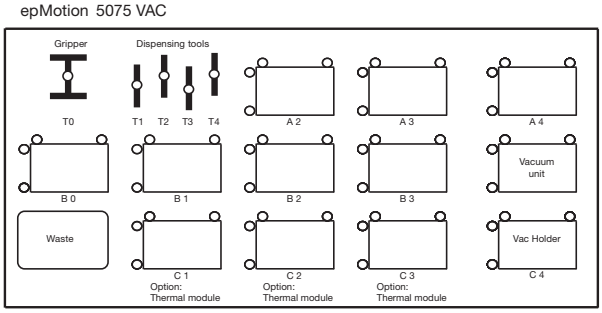
Location B0 can only be accessed by dispensing tools if it is occupied by a 300 mL or 400 mL reservoir or similar labware.

epMotion 5075 LH



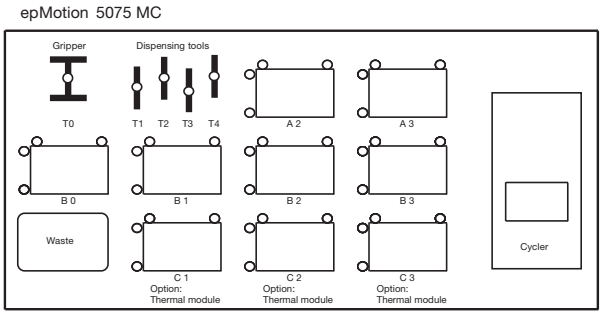
The epMotion 5075 LH has 12 locations for labware (racks, plates, thermoracks and thermoblocks or tips). Up to three thermal modules can be located on the locations C1, C2 and C3.

epMotion 5075 VAC



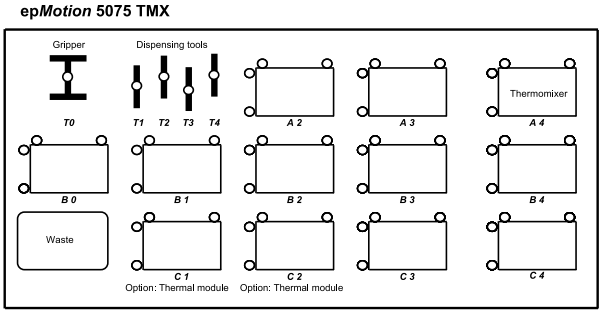
The epMotion 5075 VAC has 11 locations for labware. There is also the vacuum unit at location B4. A Vac Frame can be temporarily stored on a Vac Holder in location C4. If you are using a Vac Lid, this is positioned in location T0. Up to three thermal modules can be located on the locations C1, C2 and C3. With the version with thermomixer and vacuum unit you cannot locate any thermal modules.

epMotion 5075 MC



The epMotion 5075 MC has 9 locations for labware. A Mastercycler ep with a motorized lid can be fitted on the right-hand side of the worktable. Up to three thermal modules can be located on the locations C1, C2 and C3.

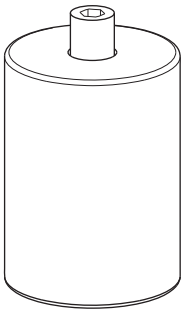
epMotion 5075 TMX



The epMotion 5075 VAC has 11 locations for labware. In addition a thermomixer is located on location A4. A thermal module can be optionally placed either onto location C1 or onto location C2. With the version with thermomixer and vacuum unit you cannot locate any thermal modules.

2.4.1.2 Worktable base adapter for the epMotion worktable

The worktable base adapter for the epMotion worktable consists of a set of 4 screw-on feet for adjusting the height of the epMotion. The screw-on feet may only be installed by service personnel authorized by Eppendorf.



2.4.1.3 Dispensing tools (tools)

A total of six different dispensing tools is available for selection. For the three volume ranges 1 to 50 µL, 20 to 300 µL and 40 to 1000 µL a single-channel dispensing tool (TS xx) and an eight-channel dispensing tool (TM xx-8) are available in each case.

The dispensing tool required for a method is automatically picked up in the tool holder of the carrier and set down again once the dispensing task is complete.

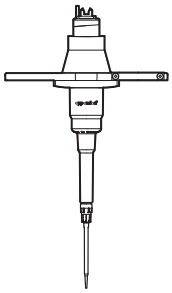


Fig. 4: Single-channel dispensing tool

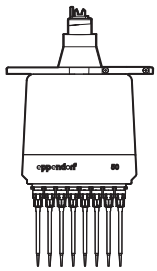


Fig. 5: Eight-channel dispensing tool

Dispensing tool	Volume range
TS 50	1 µL – 50 µL
TM 50-8	
TS 300	20 µL – 300 µL
TM 300-8	
TS 1000	40 µL – 1000 µL
TM 1000-8	

2.4.1.6 Gripper

The gripper is for transporting labware. The transport of labware is controlled in the software by means of the appropriate commands.

The 2 retaining pins on each of the gripper jaws hold the labware to be transported. Heavier labware is held by the pegs behind them.

The gripper is automatically picked up and set down by the carrier.

NOTICE!

Damage to the gold contacts from handling.

The function of the gold contacts of the gripper can be impaired through handling or contamination.

- Do not touch the gold contacts.

The gripper can transport the following labware.

- CycleLock: is transported to the PCR plate. Transport with mat inserted.
- Thermoblock: joint transport of block with a plate on it as a fixed combination.
- Thermorack: joint transport of thermorack and tubes.
- Plates: all plates like MTP, DWP, skirted PCR plates and filter plates; also pick up or set down plates on height adapter and thermoadapter.
- Reservoir 300 mL and 400 mL: watch filling levels when transporting.
- Vac Frame: transport to the vacuum unit or holder for Vac Frame.
- Vac Lid: transport to the filter plate before the vacuum is switched.

The following labware cannot be transported.

- Tip racks
- Height Adapter
- Thermoadapter
- Tubes + Racks
- Tubs + Holders

2.4.1.7 Thermal module

Temperature control is effected with the aid of Peltier elements which cool or heat labware. A temperature of 0 °C to 110 °C can be selected for the thermal modules.

WARNING!

Hazard when using flammable or explosive liquids.

- Do not use explosive substances.
- Do not heat highly flammable substances on the thermal modules or the cycler.
- Heat slightly flammable substances only in small quantities below the boiling point.
- Do not exceed the boiling point of solutions.

CAUTION!

Burns from hot surfaces.

- Do not touch the metal surface of the thermal module if the method is interrupted or after it is complete.
- Check the current temperature of the thermal modules. The temperature is displayed in the status bar at the bottom edge of the screen.
- Wait until the thermal module has cooled down completely.

If a PCR plate is placed directly on the surface of the thermal module, the wells are not temperature controlled as well and the secure location of the PCR plate on the thermal module may be impaired by relatively large tolerances in well dimensions.

When heating tubes containing organic solvents or even water/solvent mixtures, observe the safety measures and safety data sheets applicable to the solvent or the mixture.

2.4.1.8 Thermomixer

The thermomixer can temperature control labware and mix. Temperature control is effected with the aid of Peltier elements which cool or heat labware. A temperature between 4°C to 95°C can be selected.

WARNING!

Danger of injury from ejected labware when using the Thermomixer command

When employing too heavy labware and using too high speeds labware can come loose from the holder and be hurled around.

- Ensure that the front cover is closed and undamaged.
- Select low speeds with heavy labware.
- Only use compatible labware.

WARNING!

Hazard when using flammable or explosive liquids.

- Do not use explosive substances.
- Do not heat highly flammable substances on the thermomixer.
- Heat slightly flammable substances only in small quantities below the boiling point.
- Do not exceed the boiling point of solutions.

CAUTION!

Burns through hot thermomixer!

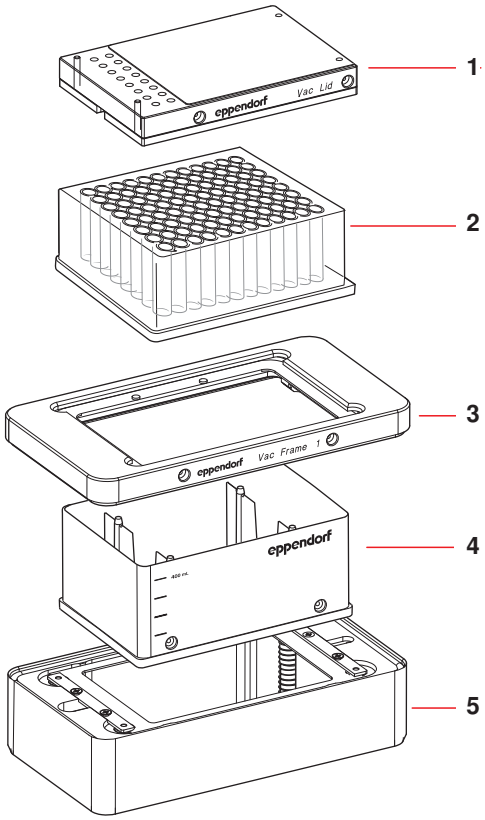
- Do not touch the metal surface of the thermomixer if the method is interrupted or after it is complete.
- Check the current temperature of the thermomixer. The temperature is displayed in the status bar at the bottom edge of the screen.
- Wait until the thermomixer has cooled down completely.

CAUTION!	**Contusion through moving thermomixer** The thermomixer can cause light contusion during operation if touched. ▸ Ensure that the front cover is undamaged and is closed during operation. ▸ Do not reach into the epMotion during operation.
NOTICE!	**Physical damage due to cross contamination and splashing liquid when using the Thermomixer command** With too high liquid level in the tubes and too high speeds liquids can splash out from the tubes which damage the device and can lead to cross contamination. ▸ Do not mix at high rotational speed with high liquid levels.
	The lowest temperature reached by the thermomixer depends on the ambient temperature and can be a maximum of 15 °C below room temperature. With a room temperature of e.g. 20 °C, the lowest temperature reached by the thermomixer is 5 °C
	If a PCR plate is placed directly on the surface of the thermomixer, the wells are not temperature controlled as well and the secure location of the PCR plate on the thermomixer may be impaired by relatively large tolerances in well dimensions.
	When heating tubes containing organic solvents or even water/solvent mixtures, observe the safety measures and safety data sheets applicable to the solvent or the mixture.

2.4.1.9 Vacuum unit (epMotion 5075 VAC only)

In the vacuum unit, a vacuum pump generates a vacuum which enables the contents of filter plates to be extracted into a collecting vessel. For example, a nucleic acid purification or PCR cleanup process can run fully automatically. Filter plates can be positioned on the vacuum unit with the aid of the gripper.

Example of load



1 Vac Lid	**2 Filter plate**
3 Vac Frame	**4 Collection vessel**
5 Vacuum unit	

A collection vessel is first placed on the vacuum unit. A metal Vac Frame is used to lower the collection vessel into the vacuum manifold. A filter plate is placed on the Vac Frame. To improve the vacuum, a Vac Lid can be placed on the filter plate.

2.4.1.10 Optical sensor

The optical sensor is located in a tube to the right of the carrier.

With the aid of an optical procedure the optical sensor measures the light reflection of surfaces, e.g., of labware on the worktable or of liquids placed in the tubes.

The optical sensor performs the following checking tasks on the epMotion 5075:

- detecting codes on tip racks and tube racks
- determining existing stocks of tips in positioned tip racks so that tip racks which have been started can also continue to be used
- checking whether the correct rack has been inserted (height detection)
- detecting height of plates
- detecting whether a location programmed as occupied on the worktable really is occupied
- detecting 30 mL or 100 mL reservoirs (tubs) and Module Racks in the Reservoir Rack
- automatically checking the adjustment of the entire device by means of exact measuring points on the surface of the worktable
- detecting the filling level of the liquids (liquid detection) in reservoirs, tubes and plates

CAUTION!

Faulty liquid detection due to air bubbles.

Liquid detection cannot be performed reliably if there are air bubbles in tubes or wells.

- Before the start of a method, ensure that there are no air bubbles in tubes or wells.
- Remove bubbles by tapping the tubes or plates sharply several times.

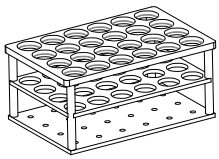
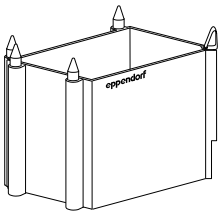
To save time and depending on the requirements of the current method, you can use the software to activate or deactivate the individual functions of the optical sensor.

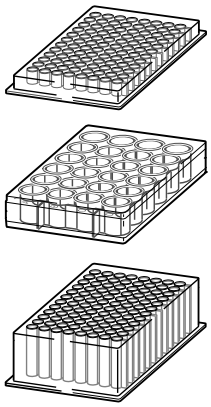
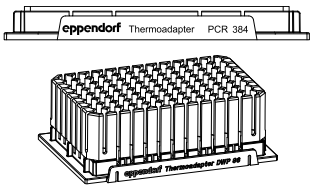
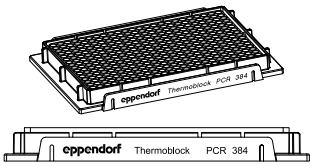
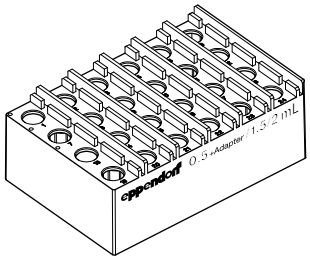
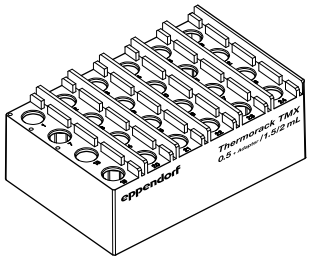
2.4.1.11 Waste system

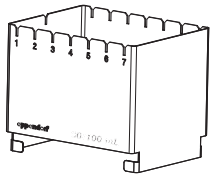
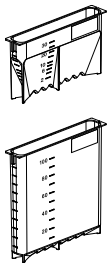
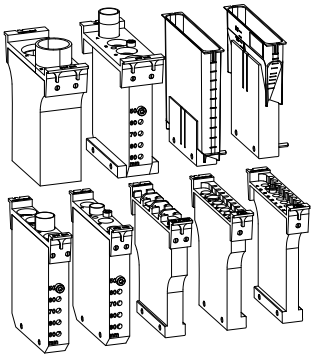
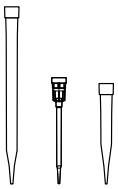
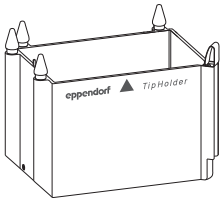
The standard waste container can hold approx. 400 individually-ejected 1000 µL tips or correspondingly more of smaller tip sizes.

2.4.2 Labware

The following list gives you an overview of the labware of the epMotion 5075. More information on available labware components can be found in the appendix (see *Labware on p. 185)* as well as in the Internet at www.epMotion.com.

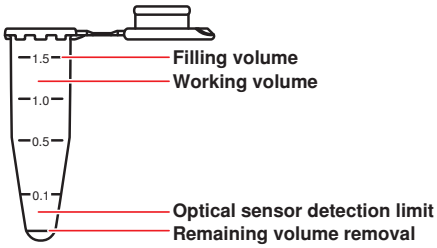
Labware	Description	Labware folder/ more information
Tubes	You can use different tubes on the epMotion 5075 by loading module racks, racks and thermoracks: • Safe-Lock tubes • Standard tubes 3810X • PCR tubes • Falcon tubes and other tubes from various manufacturers	Equip Racks + Modules with Tubes
Racks 	Racks are tube holders for up to 24 tubes with various diameters.	Equip Racks + Modules with Tubes (see *Racks for reagent tubes on p. 188)*
Height adapter 	To keep carrier travel times and distances as short as possible, there are various height adapters (with a height of 40, 55 and 85 mm) which you can use to compensate for different heights of plates.	Adapters (see *Height Adapter on p. 198)*

Labware	Description	Labware folder/ more information
Plates 	You can use different plates on the epMotion 5075: • Microplates (MTP) with 6, 24, 48, 96 or 384 wells • Deepwell plates (DWP) with 24, 96 or 384 wells • PCR plates with frame (skirted) with 96 or 384 wells • Filter plates • Tube plates with 96 individual tubes • Rack for microtubes in a 96-well grid	Plates (see *Plates on p. 199)*
Thermoadapter 	The PCR thermoadapter is used for temperature controlling 96-well and 384-well PCR plates. However, it does not form a fixed combination with a plate. The thermoadapter DWP/96 is used for temperature controlling 96-well DWP plates. However, it does not form a fixed combination with a plate.	Adapters (see *Thermoadapter on p. 192)*
Thermoblock 	The thermoblock is used for temperature controlling 96-well PCR plates (e.g., Eppendorf twin.tec semi-skirted or skirted). It forms a fixed combination with the plate which can only be moved together.	Thermoblocks with plates (see *Thermoblock (384 wells) on p. 192)*
Thermoracks 	The thermorack with lid holder and 24 positions which can be temperature controlled is for the temperature control of smaller tubes (e.g., Eppendorf Safe-Lock tubes for 0.5 mL, 1.5 mL or 2 mL). The thermorack has a high heat capacity and a slower heat transfer i.e. it retains the temperature away from the temperature control over a longer time period. But it also takes longer to reach the desired temperature.	Equip Racks + Modules with Tubes (see *Thermoracks and thermoracks TMX on p. 190)*
Thermoracks TMX 	The thermorack TMX with lid holder and 24 positions which can be temperature controlled is for the temperature-control of smaller tubes (e.g., Eppendorf Safe-Lock tubes for 0.5 mL, 1.5 mL or 2 mL). It is optimized for the application in the thermomixer as it is easier than the normal thermoracks and therefore permits higher rotational speed during mixing. It has a lower heat capacity but a faster heat transfer, i.e. it quickly reaches the desired temperature but does not retain it for long away from the temperature control.	Equip Racks + Modules with Tubes (see *Thermoracks and thermoracks TMX on p. 190)*

Labware	Description	Labware folder/ more information
Reservoir rack 	The reservoir rack is for taking up to seven reservoirs or module racks.	Equip Holder with Tubs + Modules (see *Reservoirs and reservoir rack on p. 193)*
Reservoirs (tubs) 	To supply liquids, reservoirs in sizes 30 mL and 100 mL are available. The reservoir rack carries up to seven reservoirs.	Equip Holder with Tubs + Modules (see *Reservoirs and reservoir rack on p. 193)*
	For larger volumes, an autoclavable reservoir with a capacity of 400 mL is available.	Tubs
Module racks 	TC reservoir rack modules (temperature controlled) are loaded with tubes and placed in the reservoir rack in the form of module racks.	Equip Holder with Tubs + Modules (see *Reservoir rack with module racks on p. 194)*
Tips 	epT.I.P.S. Motion are pipette tips for single use with the epMotion. They are available in three volume sizes to suit the dispensing tools (50 µL, 300 µL and 1000 µL), in each case with or without filter. epT.I.P.S. Motion are available as racks or reloads.	Tips (see *epT.I.P.S. Motion on p. 186)*
Tip Holder 	The Tip Holder is an adapter for holding the epT.I.P.S. Motion Reloads.	

2.4.3 Important volume terms for tubes and wells

The following remarks about volume terms are significant for selecting suitable tubes and plates and for some of the sequences when editing a method.



2.4.3.1 Filling volume

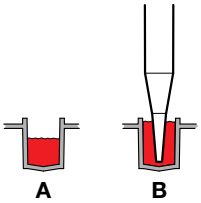
Maximum filling volume for a tube or well. A much larger volume is rejected by the software with an error message.

2.4.3.2 Working volume

The working volume for wells is primarily in the range of 50% of max. filling volume. In the case of larger tubes, the working volume is a correspondingly larger percentage. Statements about working volume should be understood as recommendations.

Low-contamination dispensing into the well or tube is possible up to the working volume with key classes of liquid.

MTP 96/384, PCR 96/384: fluid displacement in the working volume



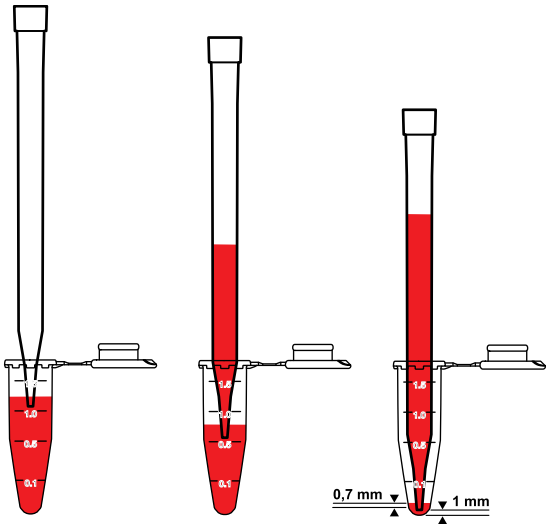
A Well filled up to working volume	**B Displacement if tip immersed to maximum depth before aspirating liquid**

When immersing tips in filled wells of 96-well and 384-well plates, volume displacement can cause the liquid to overflow if the optical sensor is switched off. You can avoid this by not exceeding the working volume in the wells.

To display the filling volume, click in the Info file window or mark the desired labware in the worktable mode.

Maximum immersion in wells is possible with all tips for 96-well plates and with 50 µL tips for 384-well plates (generally 1 mm from the bottom of the tube). To do so select in a command (**Sample Transfer**, **Reagent Transfer**) the corresponding aspirate from bottom option (see *Immersion depth and dispensing height on p. 216)*.

2.4.3.3 Remaining volume



The term "remaining volume" refers to the volume which can no longer be aspirated from a tube, and which is dependent on tube geometry.

The pipette tip is generally immersed 3 mm in the liquid before liquid is aspirated. The pipette tip is moved downwards during aspiration of liquid. The immersion depth of 3 mm is maintained.

Under standard conditions, liquid can be aspirated up to the following limit data: 1.0 mm gap between the bottom of the tube and the pipette tip and simultaneously an immersion depth of the pipette tip into the liquid of 0.7 mm. The immersion depth of the pipette tip reduces at standard conditions at the tube bottom from 3 mm to 0.7 mm. The remaining volume is therefore calculated at standard conditions from a filling level of 1.7 mm.

Special cases for remaining volume

The initial immersion depth of 3 mm is included in the liquid type of the method. Higher immersion depths are only achieved if Aspirate from bottom is used. In the case of very tall tubes (e.g., primary tubes for blood), immersion to the bottom of the tube is not possible. In these cases, the remaining volume increases. There are consequently varying remaining volumes depending on tube type. Shorter 50 µL or 300 µL pipette tips and very tall tubes result in greater remaining volumes than the long 1000 µL pipette tip. Aspirations of liquid up to the remaining volume are liable to a greater risk of being incorrect. The curvature of the liquid surface could trigger falsified aspiration results.

Changing remaining volume

Under standard conditions the smallest distance between the pipette tip and the tube bottom is 1 mm. Exceptions are 30 mL and 100 mL reservoirs where it is 2.5 mm.

Note the comments on adjusting bottom tolerance (see *Adjusting the labware bottom tolerance on p. 92)*.

2.4.3.4 Multidispense

Reverse stroke in multi-dispensing

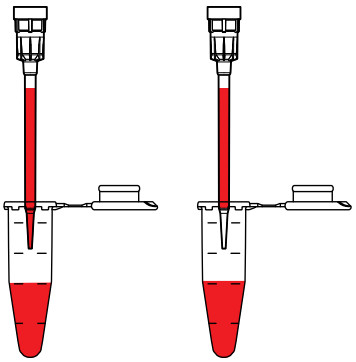


Fig. 5: Multidispense before and after reverse stroke

In multidispense, a reverse stroke takes place after aspiration of the liquid. Here the sampled liquid is returned into the source tube. The volume of the reverse stroke is included in the aspiration volume and the required volume in the source tube. At the start of the method, these volumes are automatically included in the calculation of volume by the software.

The reverse stroke is of equal size in all liquids, but varies according to pipette tip.

When dispensing the defined errors for pipetting are exceeded(see *Dispensing Tools on p. 173)*.

Extra aspiration in multi-dispensing

Following the reverse stroke, there is more liquid in the pipette tip than is required for the dispensing steps. This extra aspiration is dispensed after dispensing is complete.

The dispensing of the extra aspiration depends on the tip change. The extra aspiration is returned to the source tube if **no** tip change has been defined before the liquid aspiration. The extra aspiration is dispensed into the waste container if the tips are changed before each aspiration of liquid.

When water is multidispensed, the following approximate extra aspirations result for each pipette tip:

- 50 µL tip: approx. 2.5 µL extra aspiration
- 300 µL tip: approx. 5.0 µL extra aspiration (only about 3.7 µL with single-channel dispensing tool)
- 1000 µL tip: approx. 35.2 µL extra aspiration

Aspiration volume

Aspiration volume is the volume which can be aspirated and which is required for the task in question. The volume is calculated at the start of the method from the sum of all aspirations.

In the case of multidispense, more liquid has to be aspirated for technical reasons than is calculated from the sum of all dispensing steps.

The following volumes must be available in the source tube:

- 50 µL tip: approx. 5.8 µL reverse stroke
- 300 µL tip: approx. 45.2 µL reverse stroke (only approx. 16.7 µl with single-channel dispensing tool)
- 1000 µL tip: approx. 50.3 µL reverse stroke

The reverse stroke is of identical size with all liquids.

Example aspiration volumes with multidispense

A 96-well plate is to be filled with 10 µL water per well by the multidispense method. The eight-channel dispensing tool TM 50-8 is used. Aspiration is from one reservoir. Tips are not changed before the next aspiration of liquid.

Total aspiration volumes for multidispense:

- 10 µL for 96 wells: 960 µL
- 8 x 5.8 µL reverse stroke: 46.4 µL
- 8 x 2.5 µL extra aspiration: 20 µL
- Total: **1026.4 µL**

The volume calculation of the software increases the sum total automatically be the remaining volume that cannot be aspirated from the source tube. We do not recommend using multidispense for water before a dispensing volume of 3 µL. With small volumes, pipetting always offers better free-jet capability as well as precision and correctness. With pipetting, only the required volume is aspirated and dispensed.

2.4.3.6 Required volume

Required volume is the total of "aspirated volume" and "remaining volume" in the tube. The minimum required volume is calculated at the start with the aid of the number of samples. For reasons of reliability (meniscus formation varies in the tubes), the "Required Volume" should always be exceeded.

2.4.3.7 Volume check

Knowledge of the software is required to perform the volume check.

If it is known that the solution for dispensing has a density significantly different from that of water, check whether this needs to be compensated in the volume entry.

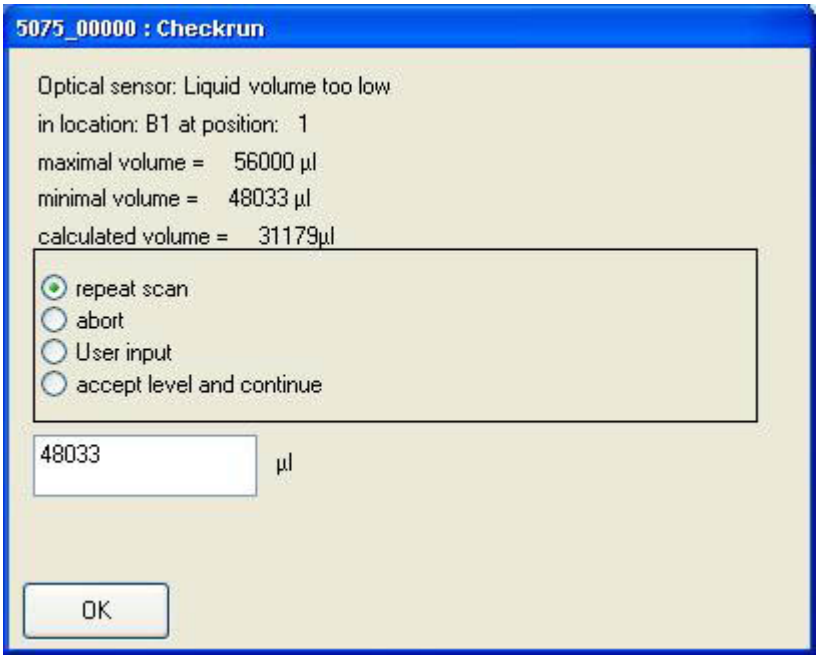
Perform the following check.

1. From the ep user and the Routine folder copy the Fill 96 method to your user directory.
2. Adapt the copied method to your own labware.
3. Weigh the corresponding plate empty.
4. Fill the plate in the epMotion with water with the aid of the modified method.
5. Weigh the plate again.
6. Repeat the process with the liquid to be tested and another plate.
7. Use the weighing results to perform a volume calculation (mass : density = volume). The density of water at 20 °C is approx. 0.9982 mg/µL; take account of the density depending on the current temperature when converting (g/mL = mg/µL). In the case of the plate filled with water, you obtain a statement about the correctness of the dispensing tool for the selected volume. Assess the result with the test liquid accordingly, taking account of the density.
8. Depending on the result, adapt the volume in the commands. Rule of thumb: a change in density of 10% for identical dispensing conditions affects the dispensing result by between 0.2% and 1%.
9. Other physical variables (viscosity, vapor pressure, surface tension etc.) of the solution likewise affect the result.

2.4.3.8 Volume correction after optical sensor error message

Knowledge of the software is required to perform volume correction.

If the optical sensor detects a too high or too low filling level or the (correct) filling level cannot be detected, a display appears during the Start sequence:



- Maximal volume indicates the maximum filling volume of the tube.
- Minimal volume indicates the required volume for aspiration based on the number of samples.
- Calculated volume is the volume calculated from the tube data and from measuring liquid level.

Perform the appropriate volume corrections at the tube:

- Reduce liquid if Calculated volume is larger than Maximal volume.
- Increase liquid if Calculated volume is smaller than Minimal volume.

NOTICE!

Collision as a result of volume correction or changes at the worktable.

- Perform volume correction only at the position displayed.
- Do not make any changes to the worktable.

Following volume correction at the tube, you have the following options.

- To perform Liquid Detection again, press the Repeat scan button and OK. Repeat scan can also be selected, for example, if the optical sensor was unable to perform a successful detection due to an air bubble in the liquid and this bubble has been removed by knocking etc.

  User input should be selected if the filling volume is below the detection limit of the optical sensor, for example.

  Overwrite the preset volume in the bottom input field with the correct volume and then press OK.
- Select accept level and continue if the displayed volume is to be accepted in a reagent transfer. The optical sensor then scans the next tube.
- Cancel the method. Select abort and then press OK.

If you happen to be working with several sources, see the comments in the Appendix (see *Pattern with several plates as source or destination tubes on p. 214)*.

3 Safety

3.1 Intended use

The device can be used in laboratories for research, development, industrial and routine work and training and education. Applications include but are not limited to the fields of life sciences, biotechnology, chemistry, clinical research, routine diagnostics. epMotion 5075 automated pipetting systems are designed for contamination-free, precise and correct measuring and transferring of liquids. The autoclavable dispensing tools work in a volume range from 1 µL to 1000 µL.

The epMotion 5075 VAC with integrated vacuum station, for example, carries out fully-automatic nucleic acid purification.

The epMotion 5075 MC with integrated Mastercycler ep is for automating PCR.

The epMotion 5075 TMX with an integrated thermomixer is used for applications which allow mixing and incubating with open tubes.

The epMotion 5075 meets the relevant fundamental requirements of the EC directives and standards listed in the declaration of conformity. epMotion 5075 automated pipetting systems are only to be used in rooms and must only be used by qualified staff with the appropriate training.

3.2 Information on product liability

In the following cases, the protection provided by the device may be impaired. The liability for the function of the device passes to the operator if:

- The device is not used in accordance with the operating manual.
- The device is used outside of the range of application described in the preceding chapters.
- The owner has made unauthorized modifications to the device.

3.3 Warnings for intended use

Read the operating manual first and observe the following general safety instructions before using the epMotion 5075.

WARNING!

Lethal voltages inside the device.

- Ensure that the housing is always closed and undamaged so that no parts inside the device can be contacted by accident.
- Do not remove the housing of the device.
- Do not allow any liquids to penetrate the inside of the housing.
- Do not allow the device to be opened by anyone except service personnel who have been specifically authorized by Eppendorf.

WARNING!

Electric shock due to damage to device or mains cable.

- Only switch on the device if the device and mains cable are undamaged.
- Only use devices that have been properly installed or repaired.
- In case of danger, disconnect the device from the mains supply.

DANGER!

Danger of explosion!

- Do not operate the device in areas where work is completed with explosive substances.
- Do not use this device to process any explosive or highly reactive substances.
- Do not use this device to process any substances which could create an explosive atmosphere.

DANGER!

Damage to health from hazardous aerosols.

When working with substances that can be hazardous to health, harmful aerosols may form and escape from the vacuum pump in an uncontrolled manner.

- Contact Eppendorf AG before starting to work with such substances.

WARNING!

Damage to health due to handling infectious liquids and pathogenic germs.

- Observe the national regulations for handling these substances, the biological security level of your laboratory, the material safety data sheets and the manufacturer's application notes.
- Wear personal protective equipment (PPE).
- Follow the instructions regarding hygiene, cleaning and decontamination.
- Comprehensive information on the regulations for handling germs and biological material in risk group II or higher can be found in the "Laboratory Biosafety Manual" (source: World Health Organization, Laboratory Biosafety Manual, in the valid version).

WARNING!

Hazard when using flammable or infectious liquids.

The waste container may contain residues of flammable or infectious liquids in ejected tips.

- If you use flammable liquids (e.g., ethanol 98%), treat the waste before disposing of it in accordance with your laboratory guidelines.
- Dispose of infectious material, waste or tips in accordance with national and local safety regulations.

WARNING!

Risk from incorrect supply voltage

- Only connect the device to power supplies which correspond with the electrical requirements on the nameplate.
- Only use sockets with a protective earth (PE) conductor and a suitable mains cable.

WARNING!

Risk to health due to contaminated device.

- Perform decontamination before storing or dispatching the device and/or its accessories.

CAUTION!

Poor safety due to incorrect accessories and spare parts.

The use of accessories and spare parts other than those recommended by Eppendorf may impair the safety, function and precision of the device. Eppendorf cannot be held liable or accept any liability for damage resulting from the use of incorrect or non-recommended accessories and spare parts or from the improper use of such equipment.

- Only use accessories and original spare parts recommended by Eppendorf.

CAUTION!

Damage to health due to ergonomically inadequate workstation.

- Follow the national regulations governing ergonomics of display workstations.

NOTICE!

Damage and corrosion from spilled liquids.

- Disconnect the power plug if relatively large quantities of liquid are involved.
- Mop up spilled liquids immediately. When mopping up, pay particular attention to specifications in the safety data sheet.
- Do not make long-term use of chemicals which form aggressive vapors (e.g., 37% hydrochloric acid). Aggressive vapors and chemicals can cause color changes to the surface or, in the course of time, cause damage to the moving parts and electronics.

NOTICE!

Damage and corrosion from liquids spilled in the vacuum unit.

- Disconnect the power plug if relatively large quantities of liquid are involved.
- Mop up spilled liquids immediately. When mopping up, pay particular attention to specifications in the safety data sheet.

NOTICE!

Damage to the device from the device tilting.

- Note that during transport epMotion 5075 the center of gravity is at the back.
- Follow national safety regulations regarding the transport of heavy loads.
- Carry the epMotion 5075 using at least two people and reach underneath the device at the sides.
- Place it on an even and strong work surface epMotion 5075 of sufficient bearing capacity. The device must not be placed on a trolley or at an angle. Check that it is horizontal using a spirit level if necessary.

NOTICE!

Damage from overheating.

- Do not place the device close to sources of heat (e.g., radiator, drying cabinet).
- Do not expose the device to direct sunlight.
- Ensure free circulation of air by maintaining a distance of at least 6 cm from adjacent devices and the wall, on all sides of the device, and keep the underside of the device clear.

NOTICE!

Impaired function due to vibration.

- Do not place the epMotion 5075 on a surface with devices which generate vibration (e.g.,vortex mixer, thermomixer, centrifuges).

NOTICE!

Size of disposables can change through autoclaving.

- Do not use autoclaved disposable products in automated applications.

NOTICE!

Faults caused by additionally installed software.

Temporary installed software can also cause faults.

- Only use software preinstalled by Eppendorf.
- Any additionally required software must be approved by Eppendorf.

NOTICE!

Data loss due to lack of data backup or incorrect storage of data carriers.

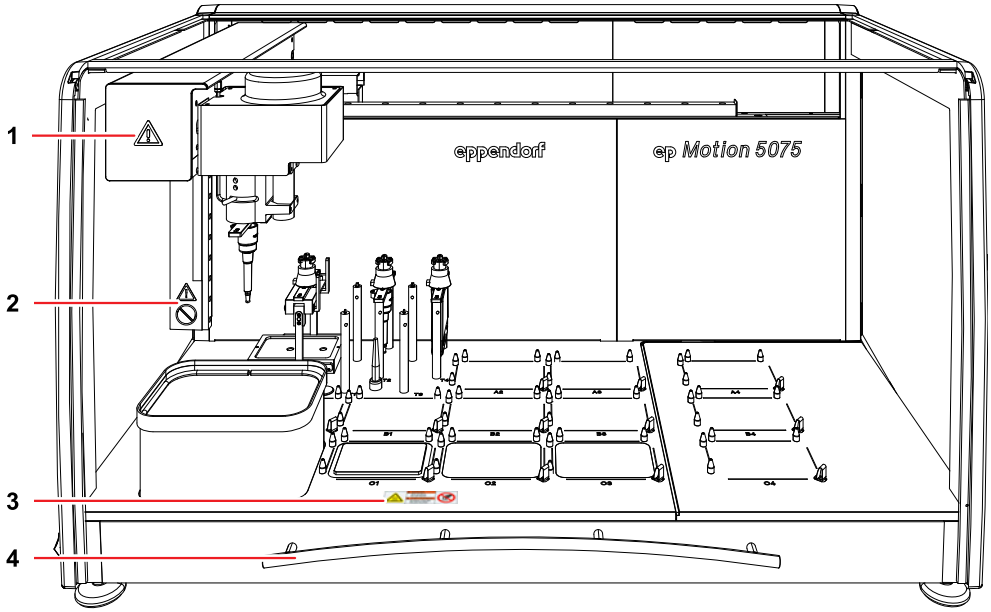
epBlue saves all information on user accounts, applications, labware and logfiles in a database on the epMotion PC. Damage to this database (e.g., due to a hardware fault) causes this information to be lost.

- Carry out regular database backups via the function Backup in Admin tab.
- Save the backup file on a secure data carrier and store it in accordance with the manufacturer instructions.

Eppendorf is not liable for data loss and its consequences.

3.4 Safety devices

This section explains the warning symbols on the epMotion and the location of the safety devices.



1		**WARNING** General hazard point. Follow the operating manual and in particular the safety notes.
2		**WARNING** Do not reach into the device when a method is running!
3		**DANGER** Risk of burns from hot surfaces.
4		The front hood serves as a safety device.

The front hood protects the user during operation of the device. A method can only be started if the front hood is closed. If the hood is opened with a method running, an error message is issued and the method is stopped.

WARNING!

Risk as a result of defective screens or failure of the protective function.

- Only operate the epMotion if screens are in perfect condition.
- Ensure that the front hood is closed during operation (e.g., for methods or test runs).
- Have defective screens replaced without delay.

CAUTION!

Risk of injury from movements by the carrier.

- Click the Stop button in the Control tab of the method.
- Wait until the carrier has completed its movements.
- Only open the front hood when all the movements are complete.

4 Installation

Installation of epMotion 5075 must always be carried out by Eppendorf AG or an Eppendorf AG service partner.

5 Operation

If you use the Mastercycler ep, please observe the operating instructions for the Mastercycler ep.

NOTICE!

Damage from UV radiation.

UV radiation can cause color changes to the surface or, in the course of time, cause damage to the moving parts and electronics of the epMotion.

- Avoid UV radiation.

5.1 First steps

5.1.1 Check correct installation

Before using the epMotion 5075 for the first time, please ensure

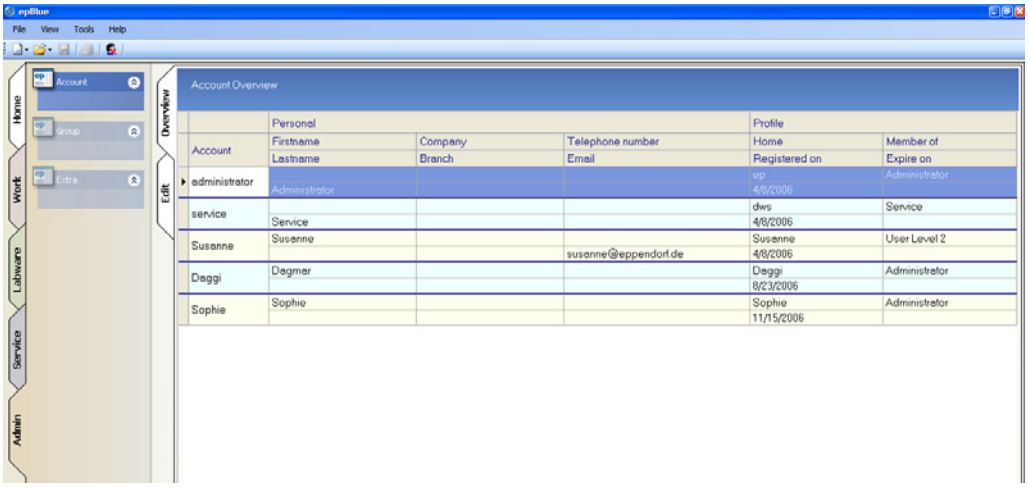
1. that the epMotion 5075 has been correctly connected and commissioned.
2. that the device is not damaged in any way

5.1.2 Creating the first user account

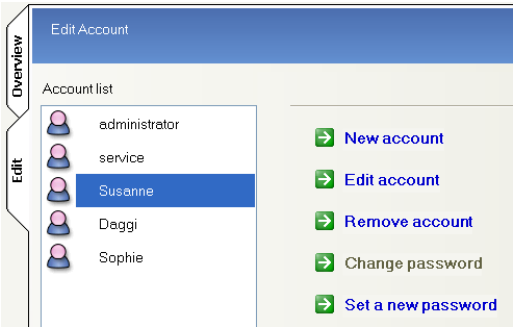
In order to be able to use epBlue, an operator's user account must be configured. It is recommended that you create individual user accounts for every operator who will use the epMotion 5075.

This section describes how, as administrator, you can create the first user account. Additional information on user accounts and user groups and their administration can be found in the extensive description of the Admin tab (see *The Admin tab on p. 108)*.

1. Start epBlue and log in as administrator (see *The Admin tab on p. 108)*.
2. Go to the administrator area and click there on the Admin tab on the left-hand side of the program window.

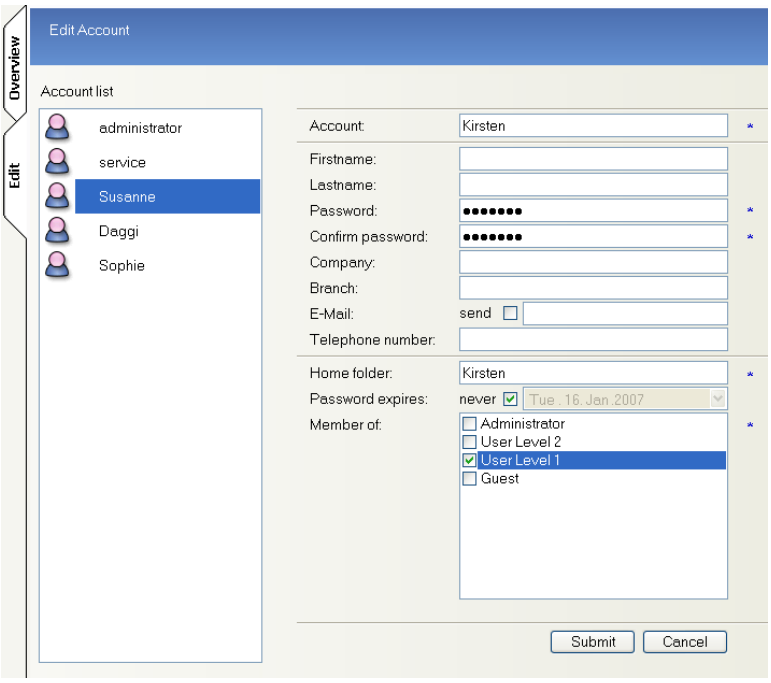


3. In the left-hand area of the **Admin** tab select the **Account** entry so that it is highlighted, and then select the **Edit Account** tab.



4. Click on **New Account**.

   The following form is displayed.

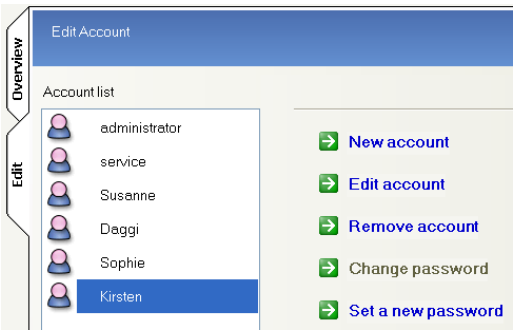


5. In the **Account** field, enter an account name for the new user.
6. In the **Password** and **Confirm password** fields, enter the password for the new user account. If the entries in the two fields do not match exactly, a message will be displayed. In this case, delete the contents of both fields and enter the password again.
7. In the **Member of** section, activate the user group to which you want the new user to belong. The user will have the user rights defined for the selected group (see *Group overview on p. 118)*.
8. If you want the user account to be active only until a certain date, deactivate the **never** option in the **Password expires** section, and set an expiry date.

   This will create a temporary account which automatically expires on the specified date. An expired account can be reactivated later by the administrator (see *The Admin tab on p. 108)*.
9. If you wish, you can enter further information about the new user, e.g., the user's name and contact information. This information is optional. If you enter the name of the user he or she will be addressed by this name in the **Home** tab after login. Otherwise the account name will appear.

10. Click on **Submit**.

    The new user account is created. The user name appears in the Account List in the **Edit Account** tab.



11. If required, create further user accounts in the same way.
12. When you have finished, log out as administrator to prevent unauthorized access to the system.

5.2 Placing labware on the worktable

This section provides you with an overview of the supply of labware on the worktable.

Beyond the preconfigured standard labware available ex works, it is also possible to dimension individual or external labware for use with the epMotion 5075 and to incorporate it in the labware directories of the software. For more information on this, contact Eppendorf Service.

CAUTION!

Burns from hot surfaces.

- Check the temperature of the thermal modules before supplying the worktable. The temperature must be below 30 °C.
- If a cycler is fitted: before supplying the worktable, check the temperature of the thermoblock. The temperature must be below 30 °C.

NOTICE!

Material damage as a result of incorrect labware on thermal modules.

- At temperatures in excess of 60 °C, only use labware made of metal, polypropylene (PP) or polycarbonate (PC) on the thermal module! An additional check of the temperature set and the labware used is effected in the method.

5.2.1 Placing the gripper and gripper holder

CAUTION!

Risk of injury from sharp pins.

Cuts or other injuries to the skin from sharp pins on the insides of the gripper jaws.

- Always grasp the gripper at the top and not inside at the gripper jaws.

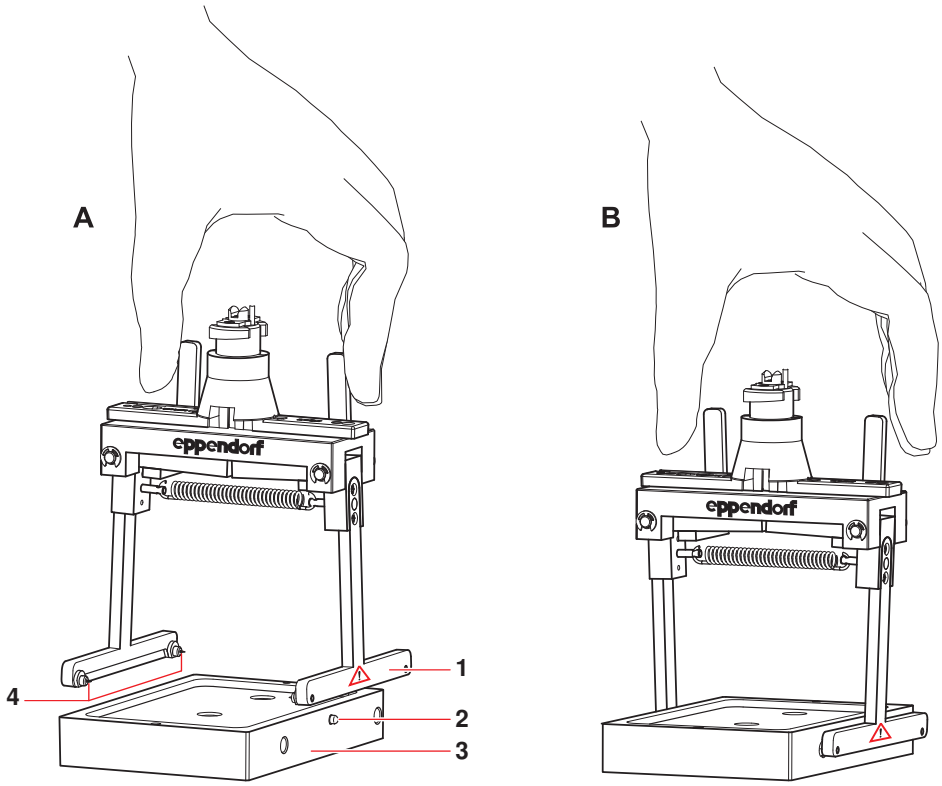


Fig. 1: Open (A) and close (B) gripper jaws

1 Gripper jaws	**2 Pin to locate gripper jaws**
3 Holder	**4 Pins**

1. Place the holder on a level work surface. The lateral pin on the holder points towards the user.
2. Press together the levers of the gripper simultaneously.
   The gripper jaws open. The gripper jaw with the warning label points towards the user.
3. Position the slightly-open gripper over the holder so that the hole on the gripper jaw could take the lateral pin of the holder.
4. Allow the retaining pins to engage in the corresponding bores of the holder.
5. Check whether the lateral pin of the holder is located in the hole of the gripper jaw.
6. Place the holder and gripper in location T0.

5.2.2 Manually filling the vacuum unit (epMotion 5075 VAC)

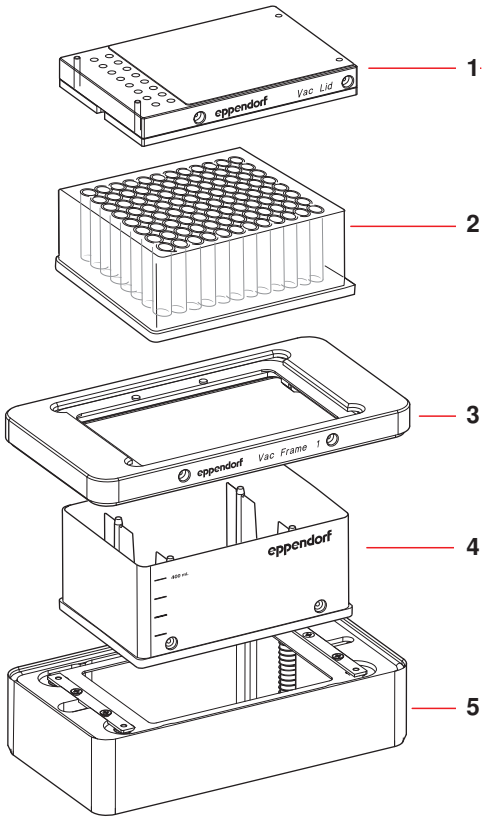


Fig. 1: Vacuum unit with supply variant

1 Vac Lid	**2 Filter plate**
3 Vac Frame	**4 Collection vessel**
5 Vacuum unit	

To supply the vacuum unit manually, perform the following steps.

1. Place the collection vessel on the vacuum unit. You can use a microplate (MTP), deepwell plate (DWP), tube plate or a filter plate as the collection vessel. The 400 mL reservoir can be used for tasks like binding or cleaning steps, for example.
2. Then place the Vac Frame on the collection vessel. If the Vac Frame is positioned incorrectly, it is impossible for an adequate vacuum to build up.
3. The weight of the Vac Frame lowers the collection vessel into the vacuum unit.
4. Place the filter plate in the Vac Frame.
5. If appropriate, place a Vac Lid on the filter plate. The "Vac Lid" label points towards the user.

5.2.3 Position labware

Avoid placing very short labware next to very tall labware. Use a Height Adapter to compensate for the difference in height.

Use location B0 only for supplying with a 300 mL or a 400 mL reservoir. The dispensing tools cannot reach other labware (e.g., plates) without restriction, so that aspiration or dispensing of liquid is possible only to a certain extent and errors occur.

1. Position the dispensing tools on holders in any sequence in locations T1 to T4. The dispensing tools are fitted to and removed from the holder on the carrier fully automatically on the epMotion. The dispensing tools required for the method are detected by their coding.
2. For methods with **Transport** commands correctly position the gripper and holder in location T0. The gripper is fitted to and removed from the holder on the carrier fully automatically during a method run. The gripper is detected by its coding.
3. When using the vacuum unit with Vac Lid: place the Vac Lid on the holder for the gripper in location T0.

NOTICE!

The lid lies loosely on the tip rack.

- Never grip the tip rack by its lid to lift it up, always by the side. Otherwise it will fall.
- Only take off the lid shortly before starting the method. The lid protects the tips from contamination.

4. Position the Tip Rack in the location on the worktable in accordance with the method. In the process, the Tip Rack is pressed against the stops on opposite sides by the spring plate at the location.
5. Remove the lid from the Tip Rack.
6. When using Module Racks: place the filled Reservoir Rack on a B or C location (excluding B0). "A" locations may not be used.
7. Position the other labware required for your method in any locations. In the process, ensure that the labware is not tilted.
8. If desired, place a waste bag in the waste container and fix in position using the clamping ring. Pull the edge of the bag tightly downwards so that the path of the dispensing tool and access to the racks is not obstructed.

5.3 Starting and exiting epBlue

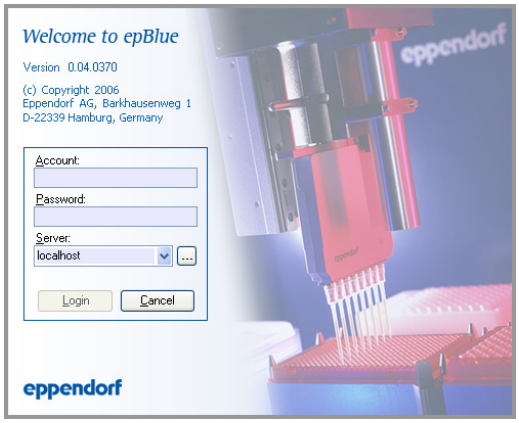
5.3.1 Start epBlue and log in with your user account.

When the PC boots up, the epBlue server software starts automatically. If the server software is stopped while the PC is running, you must start it manually before starting epBlue. To start the server software, select **Start - Programs - Eppendorf - epBlue Server** from the Windows Start menu.

To start epBlue, proceed as follows.

1. Double-click on the **Eppendorf epBlue** icon on the desktop, or select **Start - Programs - Eppendorf - epBlue** in the Windows Start menu.

   epBlue starts, and the login screen appears.

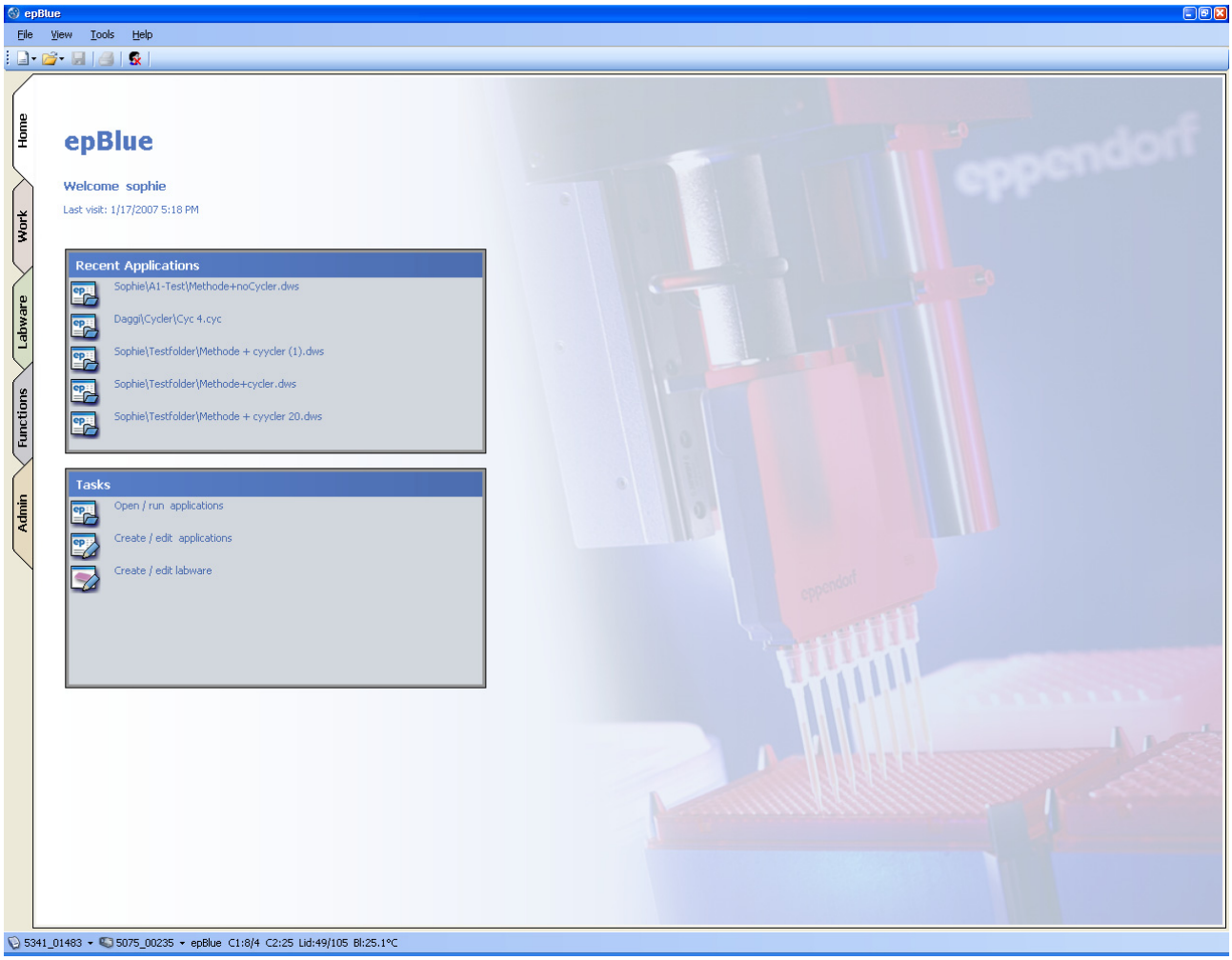


If you have forgotten your password, please contact your administrator. He can set a new password for you (see *Set up a new password on p. 116).*

Once you are logged in as a user, you can change your own password at any time. To do so, select **Tools - Account - Change Password** from the main menu.

2. Enter your account name and your password.
3. Click on **Login**.

   epBlue starts and the program window displays the **Home** tab.



The number and type of tabs on the left hand edge of the epBlue window depends on your user rights and your epBlue configuration level.

5.3.2 Logging out or exiting epBlue

You cannot log out of your account or exit epBlue while any of your applications are still running. If you need to log out or exit before your applications have finished, you must stop them manually (see *The Control tab on p. 87).*

5.3.2.1 Logout from your user account

To log out of your account, proceed as follows.

1. Save any changes you have made to your applications (see *Saving the current application on p. 55)* or to your labware (see *The Labware tab on p. 89)*.
2. Select **Tools - Account - Log out** from the menu or click on the **Logout** button.

   You are logged out of your account.

   The login screen appears. A different user can now log in.

5.3.2.2 Exiting epBlue

To exit epBlue, proceed as follows.

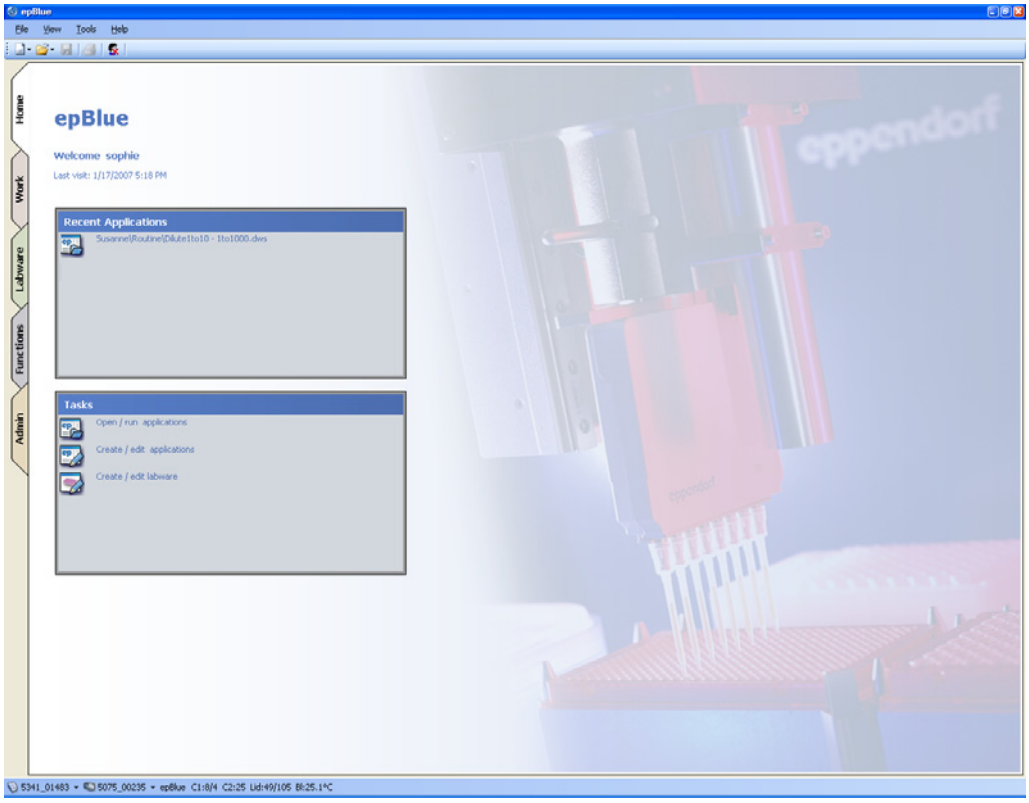
1. Save any changes you have made to your applications (see *Saving the current application on p. 55)* or to your labware (see *The Labware tab on p. 89)*.
2. Select **File - Exit** from the menu.

   epBlue is closed.

5.4 The Home tab

5.4.1 Overview of the Home tab

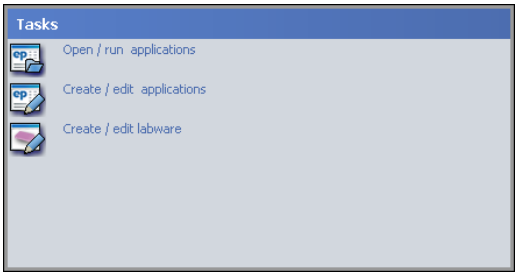
epBlue always starts with the **Home** tab. This tab offers shortcuts to common tasks and allows you to access your recently used applications quickly.



5.4.1.1 Recent applications and common tasks

In the Recent Applications section you will find a list of the applications you have used recently.

In the Tasks section you can select the most common tasks quickly and easily. Alternatively, all tasks are also available in the main menu.



5.4.1.2 Icons in the Home tab

In the Home tab the following icons are available in the toolbar under the main menu.

- New... New Application: to create a new application
- Open... Open Application / Open Labware: to open an existing application or labware
- Save (not active): to save changes to applications or labware
- Print (not active): to print applications and logfiles
- Logout: to log out of your user account and exit the software

Alternatively, these functions are also available in the File menu.

5.4.2 Open recent application

This section describes how to open those applications you have used recently. To open other applications, please refer to the section describing general file operations in the File Window (see *The file window on p. 42*).

The applications you have used recently are displayed in the Recent Applications list in the Home tab.

To open an application you have used recently, proceed as follows.

1. Click on the application in the Recent Applications.list.

   The application opens and the program window changes to the Work tab.

   You can now start or edit the application (see *The Work tab on p. 53*).

5.5 The file window

5.5.1 Access to the file window

The file window allows you to open, create and edit applications, to manage your application files and folders, and to open some types of labware for editing.

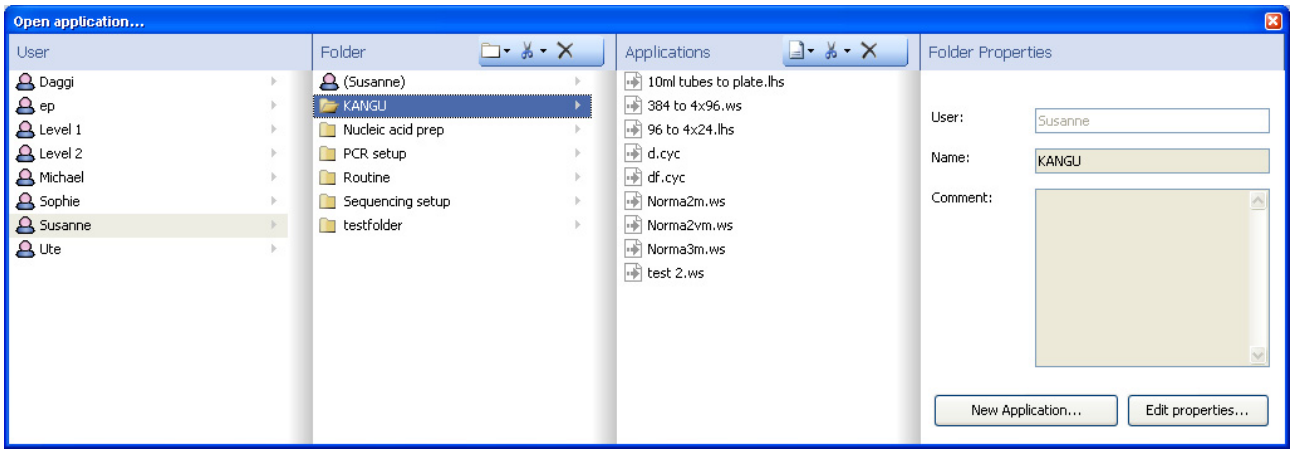
The file window has two modes, depending on the way you access it: it can show either **applications** or **labware** files.

The basic procedures carried out in the file window are described in detail in the following sections.

To avoid loss of data it is recommended to perform regular data backups of all applications and labware files. If you are logged in as User Level 2, you can backup data at any time. To restore data from a previous backup, you must be logged in as an administrator.

5.5.1.1 The file window for application files

The file window for application files shows the application files and folders available in your system.



There are two types of applications:

- **Method**: an application for epMotion which defines the worktable assignment and steps for carrying out complex liquid handling procedures. Method files for epMotion can be identified by their file extension ***.dws**.
- **Program**: an application for Mastercycler ep which defines a sequence of temperature commands and heating and cooling cycles to be carried out with the Mastercycler ep. Program files for Mastercycler ep can be identified by their file extension ***.cyc**.

To access the file window for **opening and running application files**, choose one of the following ways. If you open an application this way, epBlue will switch directly to the Run tab, where you can run the application on a compatibly device connected to your system.

- Click on Open / run applications in the Tasks section of the Home tab,
- or click on the Open icon in the icon bar and select Open Application,
- or select File - Open / run applications from the main menu.

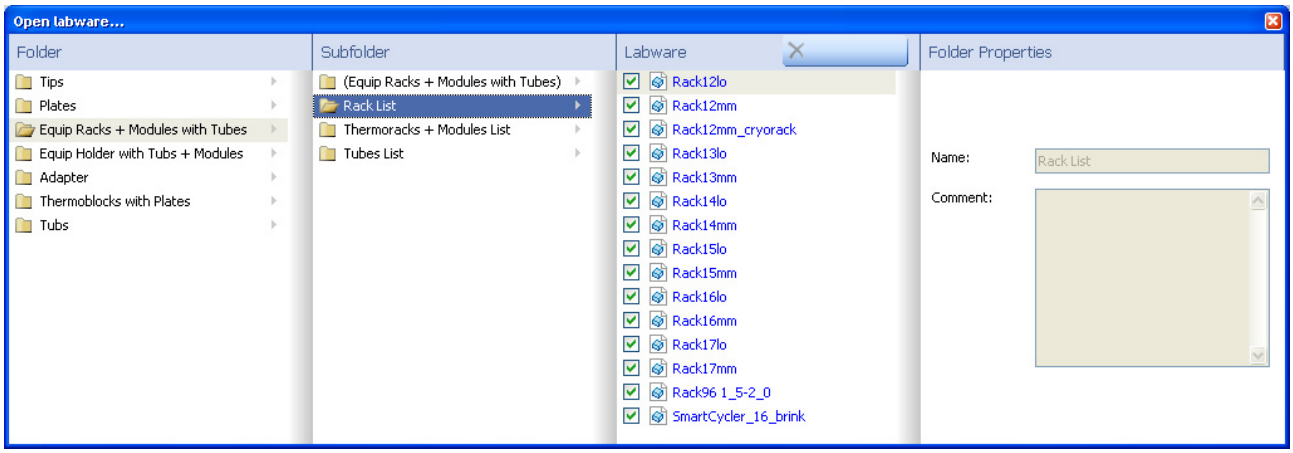
To access the file window for **creating or editing application files**, choose one of the following ways. Any applications you create and open this way will be displayed in the Worktable, where you can edit them for use in your system.

- Click on Create / edit applications in the Tasks section of the Home tab,
- or click on the New icon in the icon bar and select New Application,
- or select File - Create / edit applications from the main menu.

Further information on labware is described separately (see *Labware on p. 185)*.

5.5.1.2 File window for labware files

The file window for labware files shows the labware available in your system.



To access the file window for **opening and managing labware files**, do one of the following:

- Click on Create / edit labware in the Tasks section of the Home tab
- or click on the Open icon in the toolbar and select Open Labware,
- or select File - Create / edit labware from the main menu.

5.5.2 Opening an application

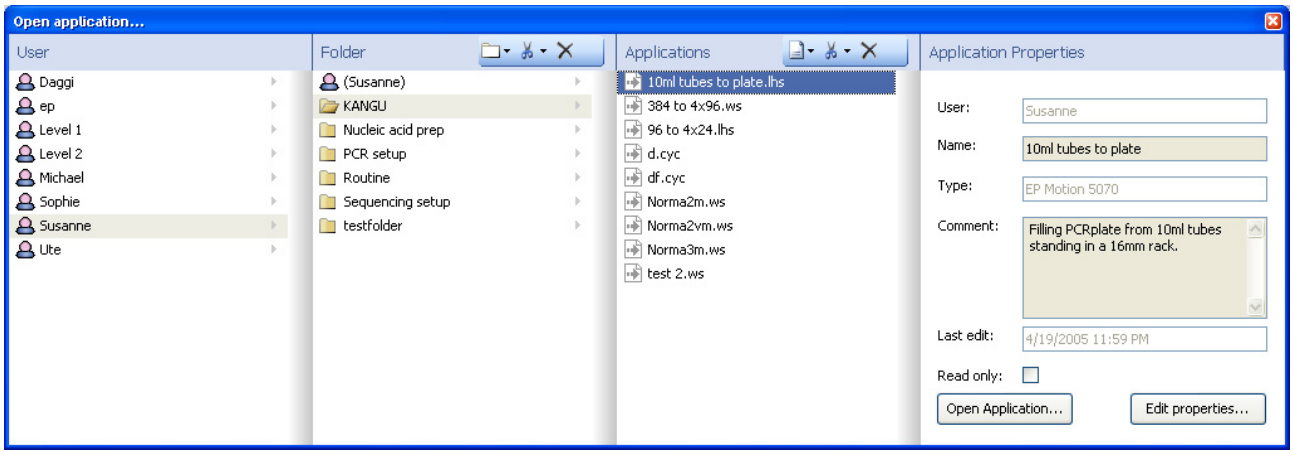
To open an application that you want to run on a device, proceed as follows.

1. Open the file window (see *Access to the file window on p. 42)*.
2. Select a user name in the user list on the left-hand side to gain access to this user's directory (usually your own).

   The folders in the selected user directory are now displayed in the Folder list.
3. In the Folder list select the folder containing the required application.

   The applications in the selected folder are now displayed in the Applications list.
4. In the Applications list select the application you want to open.

   The properties of the selected application are displayed on the right-hand side.



5. To open the selected application, click on Open Application.

   The application opens and epBlue goes to the Work (see *The Work tab on p. 53)* tab.

   If you opened the application via the Open / run applications command, epBlue goes directly to the Run tab, where you can start the application on a device connected to your system.

   If you opened the application via the Create / edit applications command, epBlue switches to the Worktable, where you can edit and run the application.

6. Alternatively, you can open an application in **read-only** mode to prevent accidental changes. To do so select the application in the Applications list, check the Read only checkbox in the Applications Properties section and click on Open Application.

   The application opens in read-only mode.

   You can now run the application, but you cannot edit it.

In the Applications list open applications are displayed with a lock.

- A **red lock** symbol indicates that this application has been opened for editing, either by you or by another user who has access to the same directory (i.e. an administrator). If an application is open for editing, it can only be opened in read-only mode by other users.
- A **yellow lock** symbol indicates that this application has been opened in read-only mode, either by you or by another user.

5.5.3 Creating a new folder in your user directory

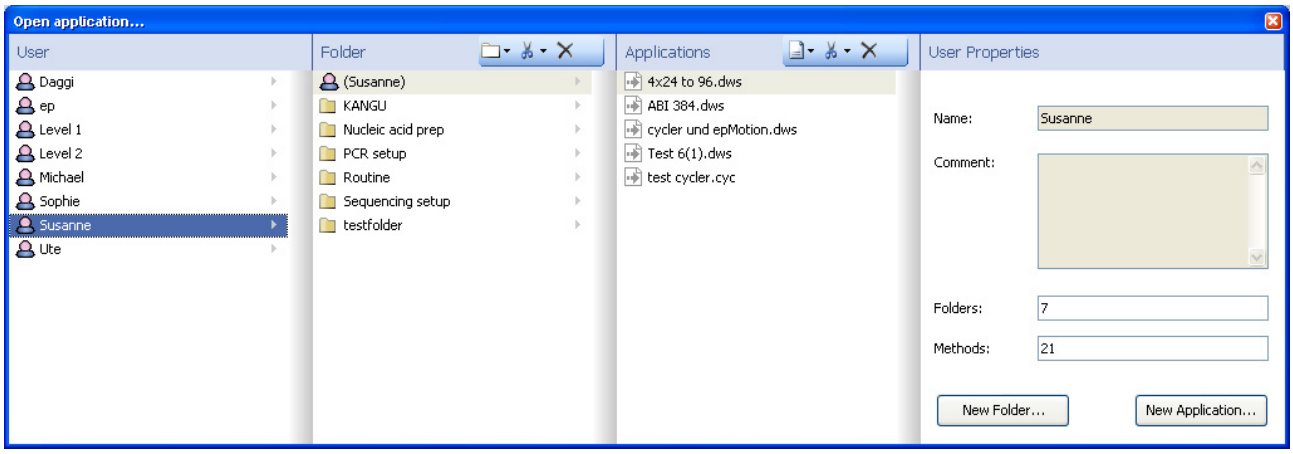
Your user directory contains the applications that you can edit and run on the available devices. To organize your applications, you can store them in folders which you create in your user directory.

To create a new folder in your user directory, proceed as follows.

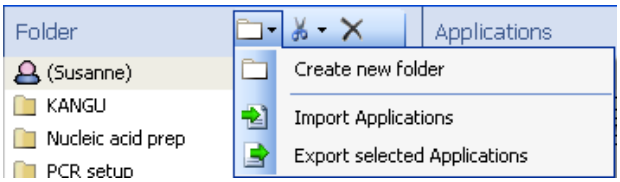
1. Open the file window (see *Access to the file window on p. 42).*
2. Select your user name in the User list on the left-hand side to gain access to your user directory.

   All folders in your user directory are now displayed in the Folder list.

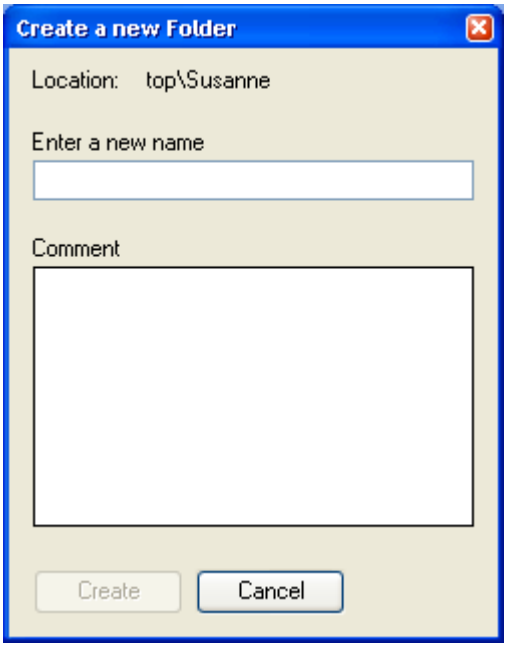
   The properties of the selected user directory are displayed on the right-hand side.



3. To create a new folder click on New Folder or click on the Create new folder icon above the Folder list.



A dialog window opens.



4. Enter a name for the new folder. If required, enter a short description of the folder in the Comment field.
5. Click on Create.

   The new folder has been created and is displayed in the Folder list.

5.5.4 Creating a new application

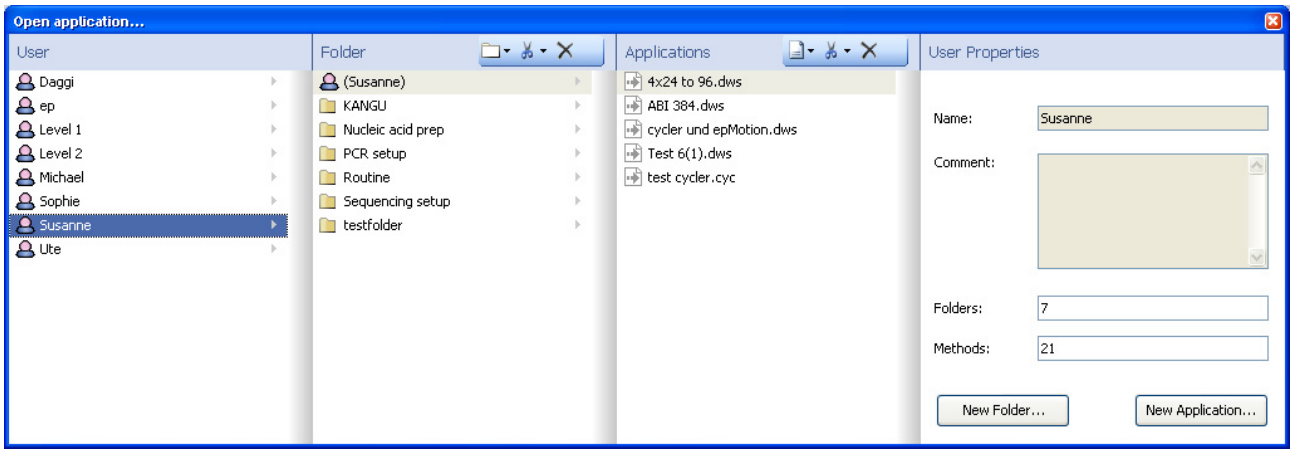
This section describes how to create a new empty application. Alternatively, you can duplicate an existing application (see *Duplicating an open application on p. 55)* and edit the duplicate. This allows you to create several similar applications quickly and efficiently.

To create a new application, proceed as follows.

1. Open the file window (see *Access to the file window on p. 42)*.
2. Select a user name in the user list on the left-hand side to gain access to this user's directory (usually your own).

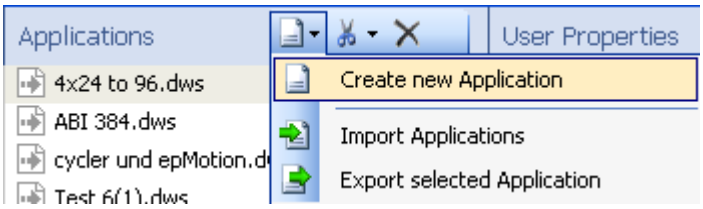
   The folders in the selected user directory are now displayed in the Folder list.

The properties of the selected user directory are displayed on the right-hand side.



You can create a new application either in the top level of the user directory, or in a folder within the user directory.

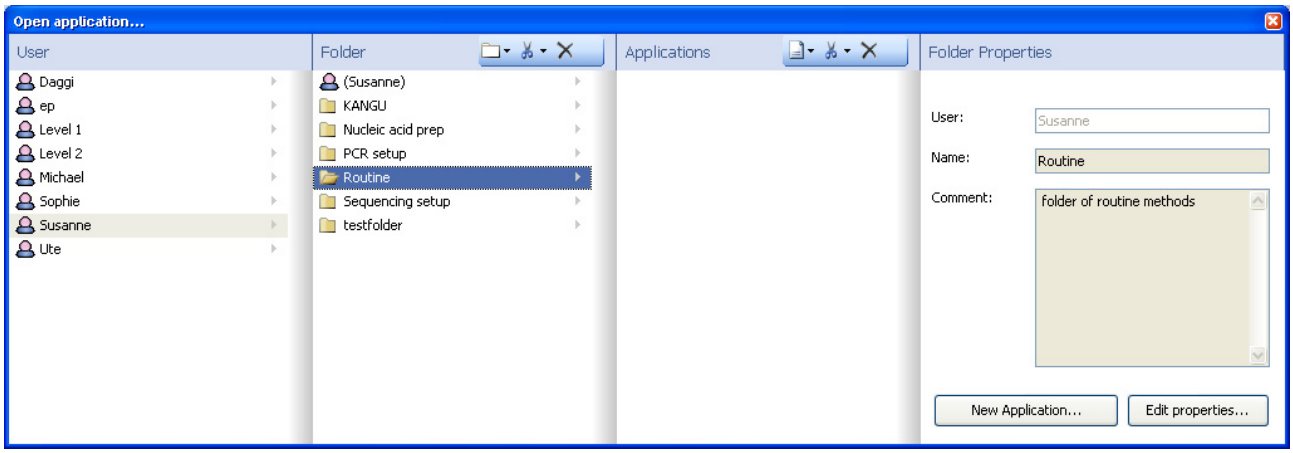
3. To create a new application at the top level of the user directory, check that the user has been selected in the User list, then right click in the Applications list and select New Application in the context menu or click on the Create new application icon above the Applications list.



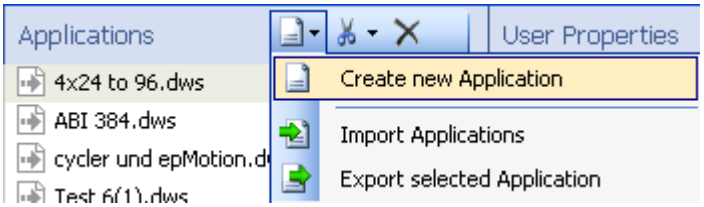
4. To create a new application in a **folder within the user directory**, select the folder in which you want to create the new application.

   The applications in the selected folder are now displayed in the Applications list.

   The properties of the selected folder are displayed on the right-hand side.



5. To create a new application in the selected folder, click on New Application in the properties section, or right-click in the Applications list and select New Application from the context menu, or click on the Create new application icon above the Applications list.



A dialog window opens.

6. Enter a name for the new application. If required, enter a short description of the application in the Comment field.
7. Select the device type for which the new application is intended.

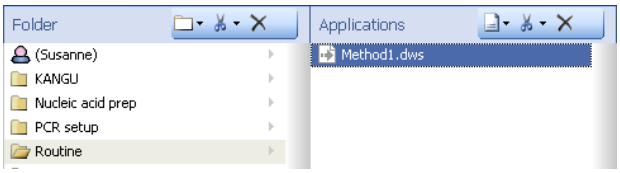
   The following options are available:

   - epMotion: a method for epMotion.
   - Cycler: a program for Mastercycler ep.

8. Click on Create.

   The new application has been created and is displayed in the Applications list.

   If you have created the application at the top level of the user directory, the user directory is now also included in the Folder list. Its name displayed in brackets.



You can now open the new application (see *Opening an application on p. 43)* and edit it in the Work tab (see *The Work tab on p. 53)*.

5.5.5 Copying applications and folders from other user directories to one's own

The **ep** directory contains standard Eppendorf applications. These applications are read-only and cannot be edited or run directly. However, you can copy them to your own directory in order to edit them or to run them on a device. In the same way, you can copy existing applications from other user's directories and adapt them to your own requirements.

To copy an application or folder from another user's directory to your own, proceed as follows.

1. Open the file window (see *Access to the file window on p. 42).*
2. In the User list select on the left-hand side the user directory containing the application or folder you want to copy.

   The folders in the selected user directory are displayed in the Folder list.

3. **To copy a folder**, select the folder in the Folder list, click on the Cut+Copy+Paste icon above the Folder list and select Copy or right click on the folder and select Copy in the context menu.

   The folder is copied into the computer clipboard.

4. **To copy an application**, select the folder which contains the required application.

   The applications in the selected folder are now displayed in the Applications list.

5. In the Applications list select the application you want to copy.

   The properties of the selected application are displayed on the right-hand side.

6. Click on the Cut+Copy+Paste icon above the Applications list and select Copy.

The application is copied into the computer clipboard.

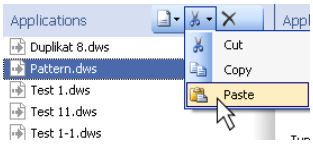
7. In the User list select on the left-hand side your own user directory.
8. **To insert a copied folder into your user directory**, click on the Cut+Copy+Paste icon above the Folder list and select Paste.

   The copied folder is inserted into your user directory.

9. **To insert a copied application**, select the folder into which you want to insert the application.

   The applications in the selected folder are now displayed in the Applications list.

10. Click on the Cut+Copy+Paste icon above the Applications list and select Paste.



The copied application is inserted into the selected folder in your own user directory.

You can now run or edit the application or applications in the copied folder (see *The Work tab on p. 53)*.

If the worktable of the copied application does not match that of the connected epMotion, you will not be able to execute the application. In this case, save the application with Save as... under a new name with the suitable worktable.

5.5.6 Editing folder and application properties

To edit the properties of a folder or application, proceed as follows

1. Open the file window (see *Access to the file window on p. 42)*.
2. To edit the properties of a folder select the folder in the Folder list.
3. To edit the properties of an application select it in the Applications list.

   The properties of the selected folder or application are displayed on the right-hand side.

4. Click on Edit properties.

   A dialog window opens. You can now edit the following properties.

   - Name: The name of the folder or application.
   - Comment: A short description of the folder or application.
   - Read only (for applications): If this option is active, the application can be opened and started, but it cannot be edited, to protect it against accidental changes.

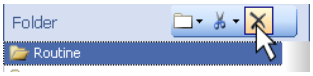
5. To save the changes, click on Save.
6. To exit the properties without changes, click on Cancel.

5.5.7 Deleting applications and folders

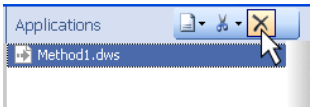
You can delete applications and folders from your own user directory. The applications and folders in the **ep** directory cannot be edited or deleted.

To delete applications or folders, proceed as follows.

1. Open the file window (see *Access to the file window on p. 42).*
2. To delete a folder select the folder in the Folder list and click on the Delete icon above the Folder list.



3. To delete an application select it in the Applications list and click on the Delete icon above the Applications list.



   A warning message appears.

4. To confirm, click on Yes.
   The selected folder or application is deleted.

5.5.8 Import applications

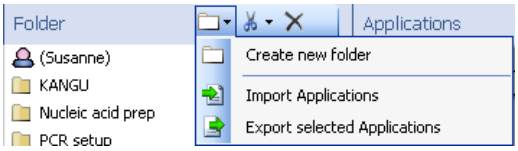
You can import applications from your hard disk or from a USB storage device into epBlue.

The following file formats can be imported:

- method files for epMotion (file extension *.dws)
- program files for Mastercycler ep (file extension *.cyc)
- older method files (file extensions *.ws or *.lhs)

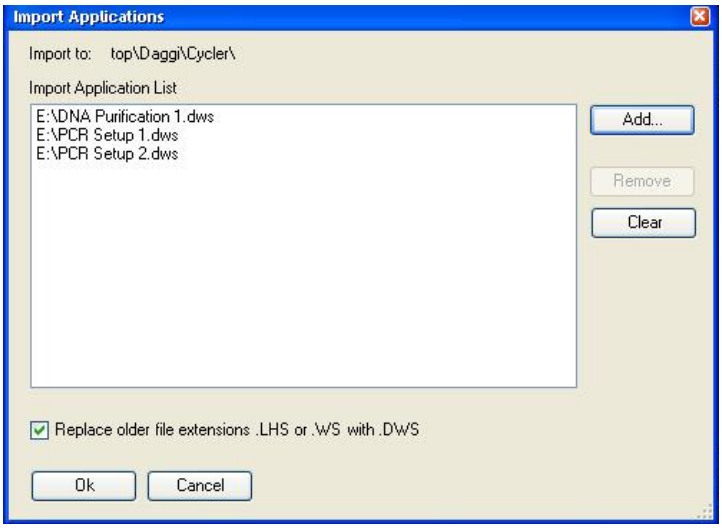
To import applications, proceed as follows:

1. Open the file window (see *Access to the file window on p. 42).*
2. Select the target directory and click on the Import Applications icon above the Folder list.



3. Alternatively click on the Import Applications icon above the Applications list.

The import window opens.



4. Click on **Add** and select the files you want to import from your hard disk or USB storage device.
5. If you are importing older method files with the file extensions *.ws or *.lhs, check the checkbox to replace these older file extensions with the new extension *.dws.
6. Click on **OK** to import the selected applications.

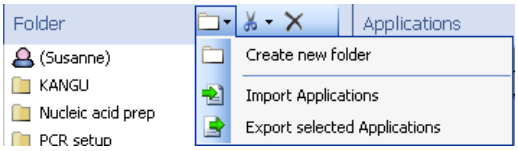
   The applications are imported into epBlue.

5.5.9 Exporting applications

You can export application files to your hard disk or to a USB storage device.

To export applications, proceed as follows.

1. Open the file window (see *Access to the file window on p. 42*).
2. To export all applications to a folder select the folder in the **Folder** list and click on the **Export Selected Applications** icon above the **Folder** list.



3. To export an individual application select the application in the **Applications** list and click on the **Export Selected Application** icon above the **Applications** list.
4. Select a target folder for the application files, click on **OK** and confirm the message to export the selected files.

   The files are exported to the specified folder.

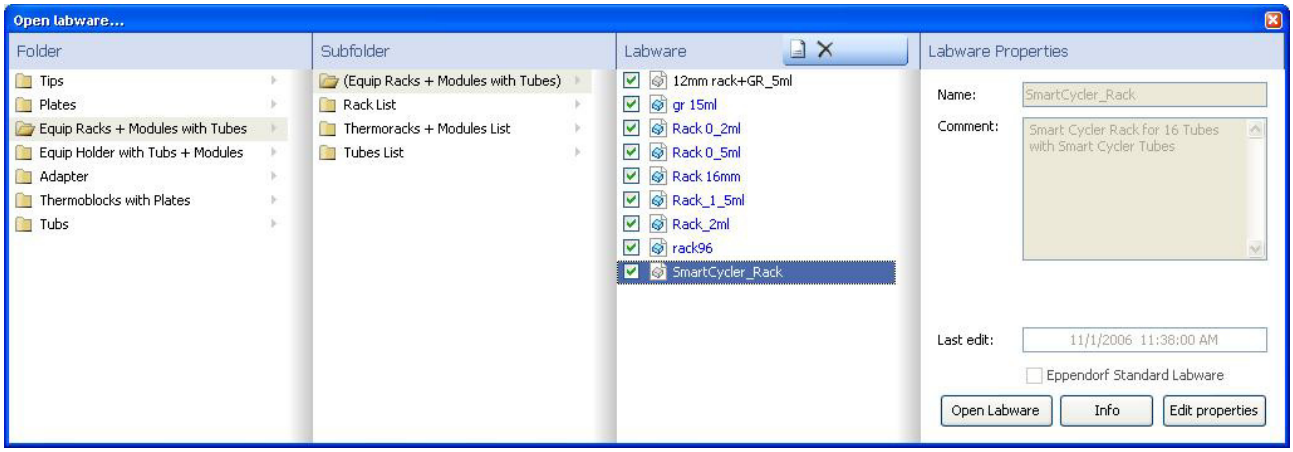
Exported epBlue applications cannot be used for the control panel.

5.5.10 Open labware for editing

This section describes how to open a labware file in the file window. For a more detailed description of the editing steps and labware types that can be edited see the description of the **Labware** tab (see *The Labware tab on p. 89)*.

This function is only available if you have the necessary user rights.

To open labware for editing, proceed as follows.



1. Open the labware file window (see *Access to the file window on p. 42)*.
2. In the **Folder** list on the left-hand side select the labware folder containing the labware you want to edit.

   If there are subfolders, these are displayed in the **Subfolder** list.
3. If required, select the subfolder.

   The labware in this folder is displayed in the Labware list.
4. In the **Labware** list select the labware you want to open.

   The properties of the selected labware are displayed on the right-hand side.
5. To open the selected labware, click on **Open Labware**.

   The labware opens and the program window changes to the **Labware** tab.

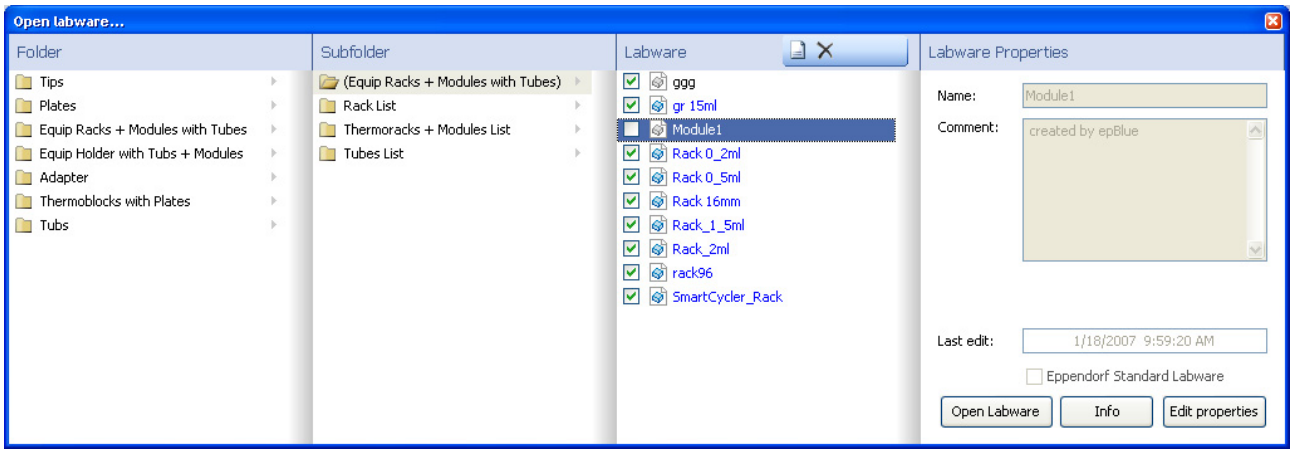
   You can edit the labware, or create new labware or labware combinations for use in your applications. You can equip racks or modules with tubes (see p. 93), and you can equip reservoir racks with various reservoirs and equipped modules (see p. 97).

5.5.11 Deleting a labware combination

You can delete only labware combinations created by yourself or by other users in your system. Labware identified in the **Labware Properties** section as **Eppendorf Standard Labware** cannot be deleted.

To delete a labware combination you have created, proceed as follows.

1. Open the labware file window (see *Access to the file window on p. 42*).



2. In the **Folder** and **Subfolder** lists select the labware folder containing the labware you want to delete.

   The labware in this folder is displayed in the **Labware** list. Eppendorf Standard Labware is displayed in blue, it cannot be deleted.

3. Select the labware you want to delete and click on the **Delete** icon above the **Labware** list.

   A warning message appears.

4. To confirm, click on **Yes**.

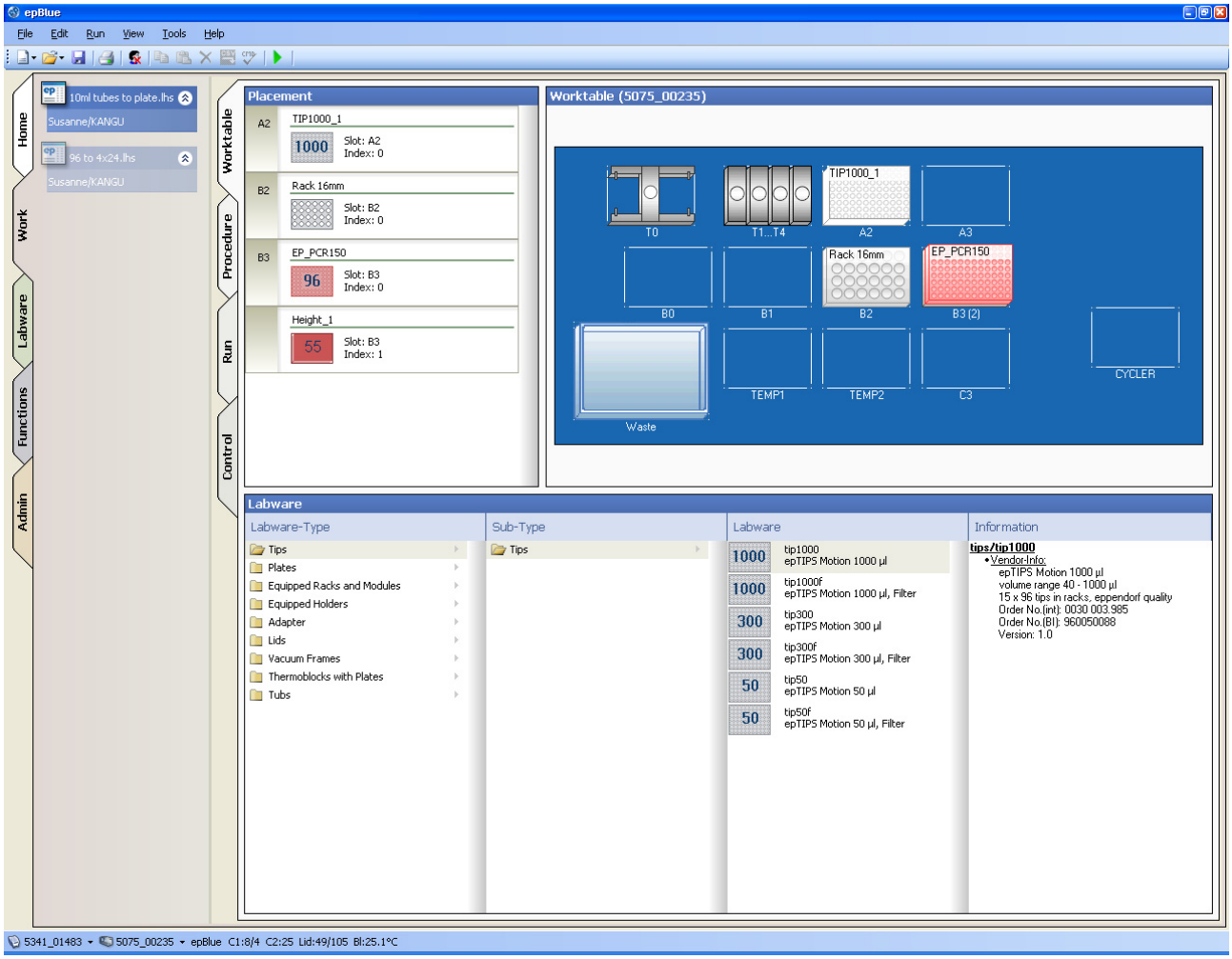
   The labware is deleted.

5.6 The Work tab

5.6.1 Overview of the Work tab

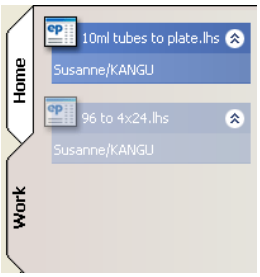
If the Work tab is empty when opened, you first have to open an application via the Home tab (see *The Home tab on p. 40)* or the file window (see *Opening an application on p. 43)*.

epBlue automatically changes to the Work tab if you have opened an application via the Home tab or the file window. You can also access the empty Work tab by clicking with the mouse. In the Work tab you can edit your own applications and start them on the available devices.



5.6.1.1 List of open applications

On the left-hand side of the Work tab a list with all open applications is displayed. Several applications can be open at the same time and can be edited or run in parallel. The current application is highlighted. To switch between the applications, click on the application names in the list.



There are two types of applications:

- **Method**: an application for epMotion which defines the worktable assignment and steps for carrying out complex liquid handling procedures.
- **Program**: an application for Mastercycler ep which defines a sequence of temperature commands and heating and cooling cycles to be carried out with the Mastercycler ep.

5.6.1.2 Tabs for editing and running epMotion-applications (methods)

If you have opened a method (i.e. an application for epMotion), the Work tab displays several tabs:

- Worktable: In the Worktable tab you equip your worktable with the labware required for the method (see *Worktable tab - equip the worktable on p. 58)*.
- Procedure: In the Procedure tab you define the sequence of the commands to be executed when the method is run (see *Procedure tab - defining a procedure on p. 62)*.
- Run: With the Run tab you can start your method on one or several devices available in your system (see *The Run tab on p. 81)*.
- Control: In the Control tab you can monitor and control the devices on which your method is currently running (see *The Control tab on p. 87)*.

5.6.1.3 Icons in the Work tab for epMotion applications (methods)

When you have opened a method (i.e. an application for epMotion), the Work tab displays the following icons in the toolbar below the main menu.

- **New... New Application**: to create a new application for editing
- **Open... Open Application/Labware**: to open an existing application/labware
- **Save**: to save changes to your methods
- **Print**: to print a report
- **Logout**: to log out of your user account and exit the software
- **Copy** (only active in the Procedure tab): to copy objects (commands) to the clipboard of the computer.
- **Paste** (only active in the Procedure tab): to insert objects (commands) from the clipboard of the computer.
- **Delete** (only active in the Procedure tab): to delete a selected object (command).
- **CSV Import** (only active in the Procedure tab): to import commands from a CSV file to the Procedure.
- **Check Method** (only active in the Procedure tab): to check method parameters.

- **Start Method**: to start a method on a device.

Alternatively, these functions are also available in the **File** menu.

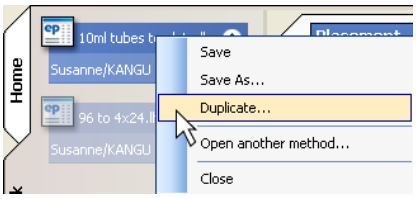
Additional information on the selection of tasks, e.g., opening or creating methods or managing method files and folders, can be found in the detailed description of the Home (see *The Home tab on p. 40)* tab and in the file window (see *The file window on p. 42)*.

5.6.1.4 Duplicating an open application

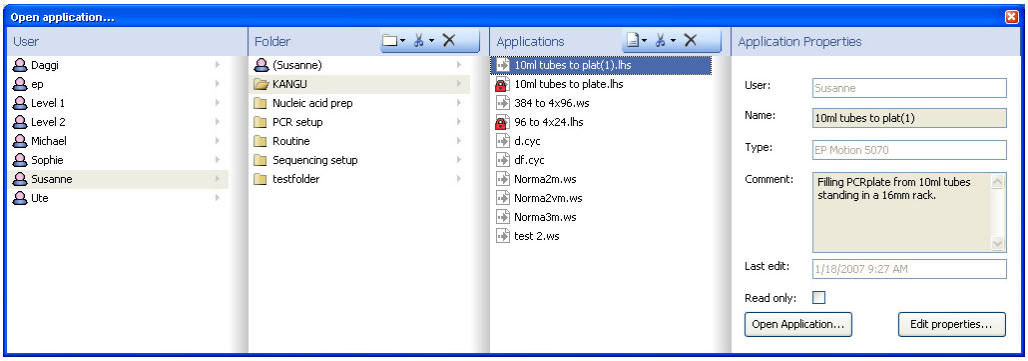
If an application is read-only or is running on a device, it is protected and cannot be edited. However, you can create a duplicate which you can edit.

To create a duplicate of an open application, proceed as follows.

1. Select the application in the list of open applications on the left-hand side.
2. Right-click on the application name and select Duplicate from the context menu.



The file window opens.



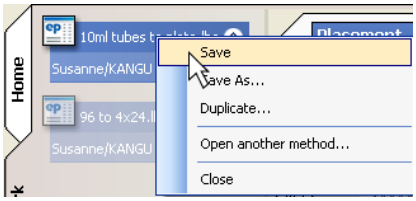
The duplicate application is created and displayed in the Applications list. The file name of the duplicate application is a copy of the name of the original application file plus a number in brackets. If you create more than one duplicate of the same original application, the duplicates are numbered consecutively.

You can now open the duplicate application or edit its properties (see *The file window on p. 42)*.

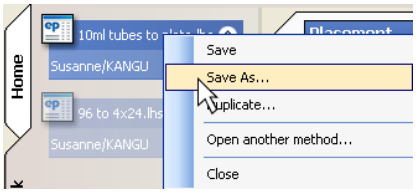
5.6.1.5 Saving the current application

To save the current application, proceed as follows.

1. Select the application in the list of open applications on the left-hand side of the Work tab.
   The current application is highlighted in darker blue.
2. To save the application under the same name, click on the Save icon, or select File - Save from the main menu, or right-click on the application name and select Save from the context menu.



3. To save the application under a new name, select File - Save As from the main menu, or right-click on the application name and select Save As from the context menu.



A dialog window opens.

4. Enter a file name and click on Save.

   The application is saved in your user directory.

5.6.1.6 Printing applications and logfiles

You can print a description of the current application, e.g., the worktable assignment and procedure of commands defined in a method.

When the application has been executed on a device connected to your system, you can also print the logfiles of every individual run. The logfiles record every program step carried out by the device (see *Reading logfiles on p. 88)*.

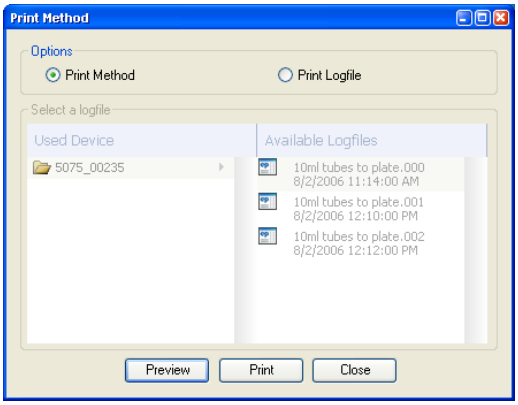
To print an application or its logfiles, proceed as follows.

1. Select the application in the list of open applications on the left-hand side of the Work tab.

   The current application is highlighted. To print the method, select the worktable. To print a logfile of the method, select the Logs tab.

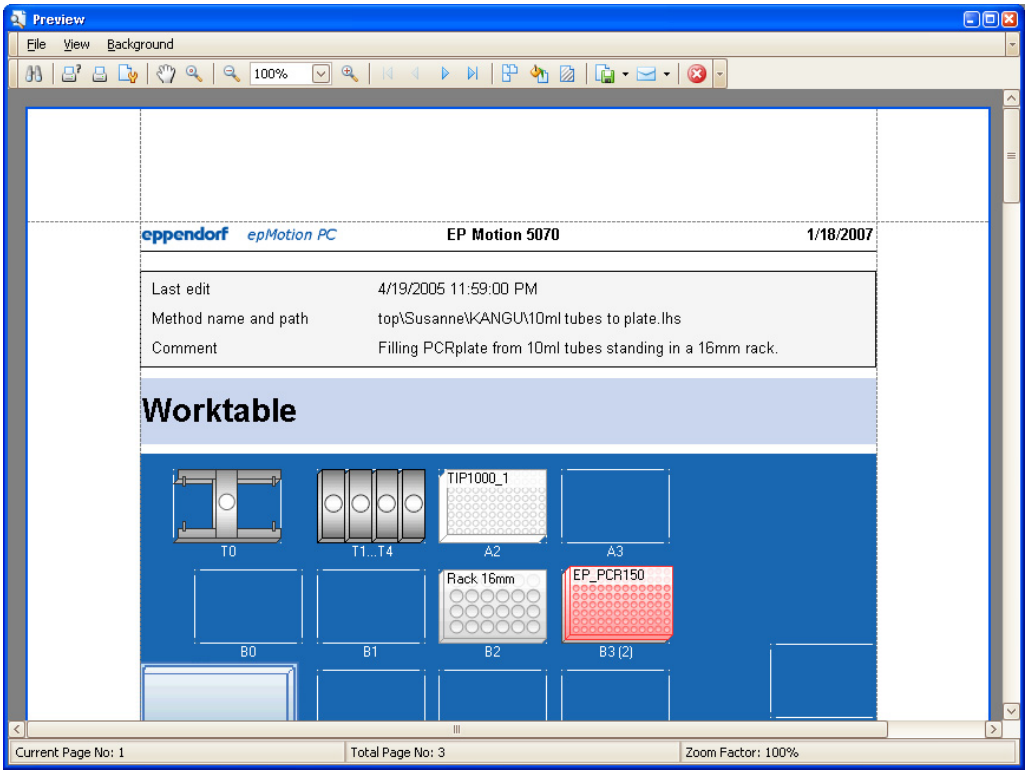
2. Click on the Print icon, or select File - Print from the main menu.

   The print window opens.



3. Select Print Method if you want to print a description of the application. Select Print Logfile if you want to print the logfile of a previous run of this application, and select the device and the required logfile from the list below.
4. To print the application or logfile on the standard printer configured in your system, click on Print.

5. To display the application or logfile in a separate window, click on Preview. The Preview window opens.



In the Preview window, the following icons are available (from left to right):

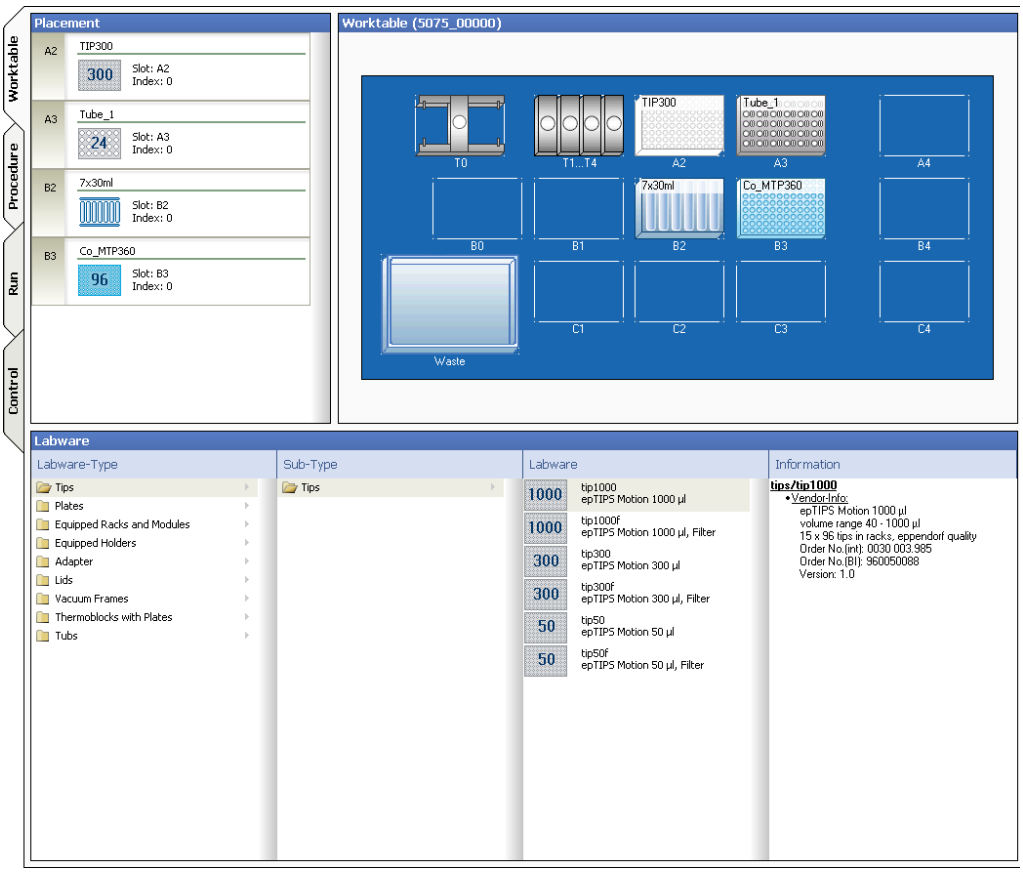
- **Search**: to search the document text.
- **Print**: to select a printer and print the document.
- **Print Direct**: to print the document on the standard printer configured in your system.
- **Page Setup**: to change the page setup before printing.
- **Hand Tool**: to navigate by dragging the document up or down with the mouse.
- **Magnifier**: to toggle the zoom factor between 100% and full-page view.
- **Zoom** / **Zoom Out** / **Zoom In**: to adjust the zoom factor.
- **First** / **Previous** / **Next** / **Last Page**: to navigate through the document pages.
- **Multiple Pages**: to specify the number of pages displayed in the Preview window.
- **Background** / **Watermark**: to change the background color and to insert a watermark.
- **Export Document**: to export the document to a file (e.g., pdf, txt, csv or xls).
- **Send E-mail**: to distribute the document via e-mail.
- **Close Preview**: to close the Preview window.

6. Print or export the document as required, using the icons in the Preview window, as described above.
7. To exit the preview, click on the Close Preview icon, or select File - Exit, or close the Preview window.
8. To close the print window, click on Cancel.

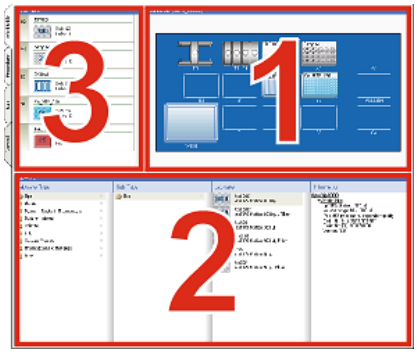
5.6.2 Worktable tab - equip the worktable

In the Worktable tab you equip worktable of the epMotion with the labware required for the method.

To go to the Worktable tab select the Work tab on the left-hand side of the program window and select the Worktable tab.



The Worktable tab is divided into 3 sections.



The Worktable (section 1) is displayed in the top right section of the Worktable tab. It shows the worktable assignment for the active method. You can edit the worktable with the mouse, add and remove labware or move labware to a different location on the worktable.

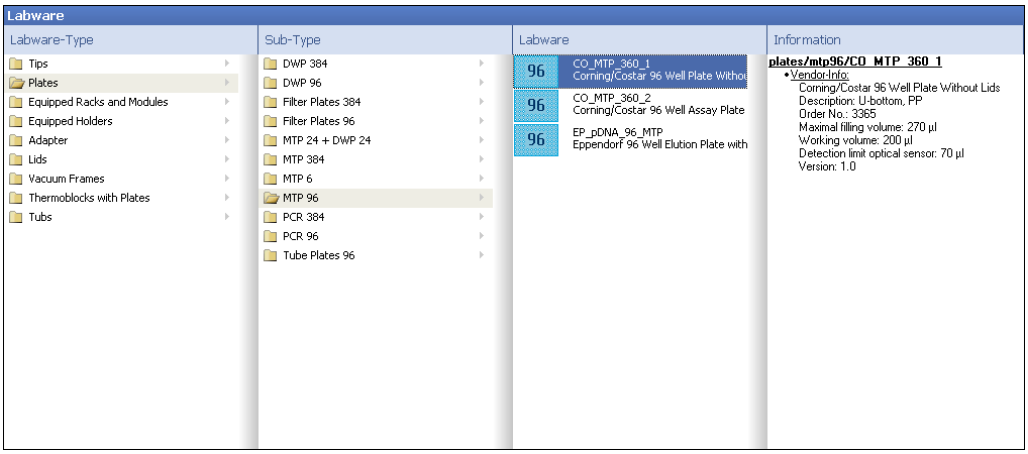
The Labware list (section 2) is displayed in the bottom section of the Worktable tab. It contains the available labware that you can place on the worktable.

The Placement list (section 3) is displayed in the top left section of the Worktable tab. It shows a list of all occupied worktable locations and the labware placed at each location.

5.6.2.1 Positioning labware on the worktable

To position labware on the worktable, proceed as follows.

1. In the Labware Type list select the type of labware you want to use (e.g., "Plates").
   If there are subgroups they are displayed in the Sub-Type list.
2. In the Sub-Type list select the subgroup you want to use (e.g., "mtp96").
   The available labware of this type is displayed in the Labware list.
3. In the Labware list select the labware you want to position on the worktable (e.g., "CO_MTP_360_1").
   Some information on the selected labware is displayed on the right-hand side.



4. To position the labware on the worktable, press the left mouse button and keep it pressed, dragging the labware upwards from the list.

While you are dragging the labware, it is attached to the mouse pointer by its upper left-hand corner. To position the labware on the worktable, direct the mouse pointer (not the center of the labware icon) to the intended location. The mouse pointer carries a small "+" (plus) symbol if the labware can be positioned at the current location.

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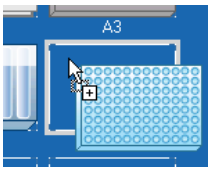
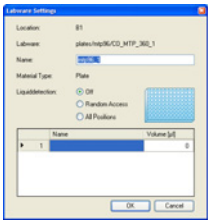
5. Drag the labware to its intended location on the worktable and drop it there by releasing the mouse button.



A dialog window opens which allows you to change the settings for this labware.



6. If required, edit the name of the labware in the Name field.

7. If the optical sensor is to perform liquid detection at this location during the method, then set the desired option.

   The following options are available:

   - Off: Liquid detection is switched off at this location. If you use this option, click in the Volume field and specify a volume for the labware.
   - Random Access: The optical sensor performs liquid detection at a few randomly-selected positions of this labware.
   - All Positions: The optical sensor performs liquid detection at all positions of this labware. It is not recommended to select this option for racks and plates with 96 positions, as this is time-consuming.

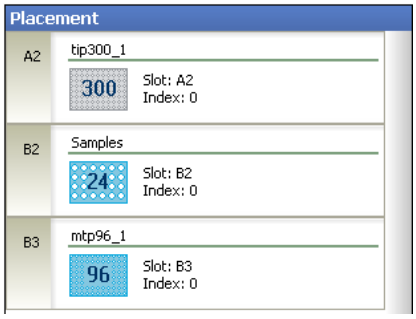
   If required, you can always edit these settings again later (see *Editing labware properties on the worktable on p. 62)*.

8. Click on OK to confirm the settings.

   The labware is positioned in the location.

9. Proceed in the same way to supply the other locations on the worktable.

The labware on the worktable is also displayed in the Placement list on the left-hand side of the Worktable tab.



When positioning labware, please note the following restrictions:

- **all A locations:** no reservoir rack.
- **Location B0:** not all labware items are suitable.
- **all C locations:** no tips.
- **Vac Lid** can only be placed in gripper position.

To check whether a particular labware item can be positioned in a location, try dragging the labware over that location and observe the shape of the mouse pointer: the labware can be positioned only if the mouse pointer carries a "+" (plus) symbol.

5.6.2.2 Stacking labware at a location

You can stack certain labware components at a location one above the other, e.g., selected plates or a height adapter and a plate.

In a location you can stack a maximum of five predefined plates from Eppendorf, in the vacuum unit you can stack four labware components. The maximum stacking height is 126 mm. The following plates can be stacked in a location:

- EP_pDNA_96_MTP
- EP_TT_PCR_150
- EP_TT_PCR_40
- EP_DWP_1200
- EP_pDNA_96_DWP

To stack labware at a location, the specifications (geometry, name, bottom tolerance etc.) of the plates must be the same.

Additional labware suitable for stacking is available for download in the VIP section at www.epMotion.com. To download and import this labware, carry out a labware update.

Dispensing operations are not possible from a plate stack.

Stacks may not be transported by the gripper. Individual plates are removed from the stack for transport.

The optical sensor can perform location detection. Liquid detection is not possible.

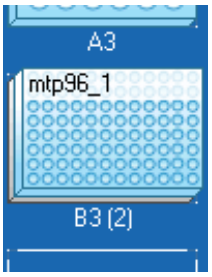
When stacking plates, ensure that the filling level is adapted. The working volume should not be exceeded.

When stacking labware, always proceed in just the same way as when normally positioning individual labware components (see *Positioning labware on the worktable on p. 59)*.

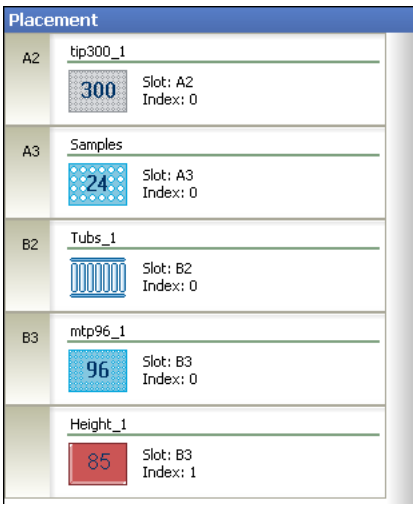
To stack labware at a location, proceed as follows.

1. Select and position the labware which is to be located in the **bottom** location (e.g., a height adapter.
2. Select and position the labware which is to be located at the same **top** location (e.g., a plate). Proceed in just the same way as when positioning the bottom labware component.

   The two labware components are displayed in the location. The number of stacked items is displayed in brackets next to the location name.



The stacked labware components are also displayed in the Placement list on the left-hand side of the Worktable tab.

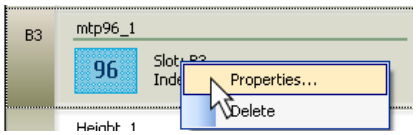


5.6.2.3 Editing labware properties on the worktable

You can edit the labware properties also for labware already placed onto the worktable.

To display and edit the properties of labware on the worktable, proceed as follows.

1. Double click on the labware on the worktable or right click on the labware in the Placement list and select Properties from the context menu.



2. To edit the properties of stacked labware further down in the stack (e.g., a height adapter), right click on the labware in the Placement list and select Properties from the context menu. This labware can only be accessed via the Placement list.

   A dialog window opens which allows you to change the settings for this labware.

3. If required, edit the name of the labware in the Name field.
4. If the optical sensor is to perform liquid detection at this location during the method, then set the desired option.

   The following options are available:

   - Off: Liquid detection is switched off at this location. If you use this option, click in the Volume field and specify a volume for the labware.
   - Random Access: The optical sensor performs liquid detection at a few randomly-selected positions of this labware.
   - All Positions: The optical sensor performs liquid detection at all positions of this labware. It is not recommended to select this option for racks and plates with 96 positions, as this is time-consuming.

5. Click on OK to confirm the settings.

   The changed labware properties are active.

5.6.2.4 Remove labware from the Worktable

To remove labware from the worktable, proceed as follows.

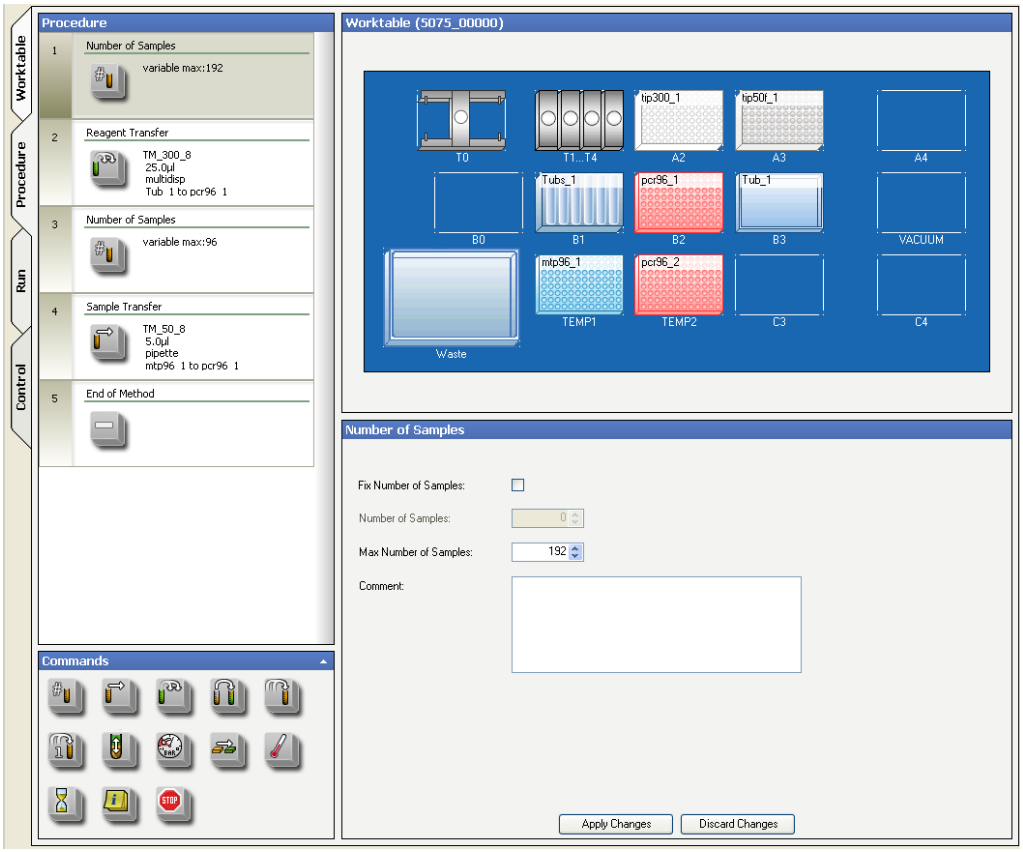
1. Right-click on the labware on the worktable or right-click on the labware in the Placement list and select Properties from the context menu.
2. Or drag the labware from its location on the worktable to the waste position with the mouse,and drop it there.

   The labware is removed from the worktable and also from the Placement list.

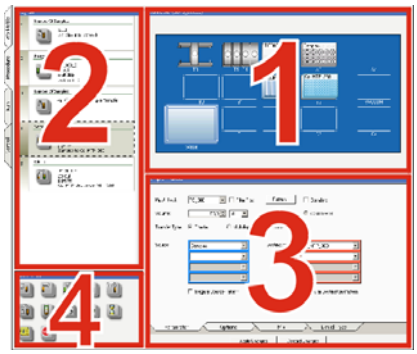
5.6.3 Procedure tab - defining a procedure

In the Procedure tab you can define the sequence of the commands to be executed when the method is run. It is recommended to first equip the worktable with the required labware before changing to the Procedure tab (see *Worktable tab - equip the worktable on p. 58)*.

To go to the Procedure tab select the Work tab on the left-hand side of the program window and select the Procedure tab.



The Procedure tab is divided into 4 sections.



The Worktable (section 1) is displayed in the top right section of the Procedure tab. It shows the current worktable assignment for the active method. To edit the worktable you have to change to the Worktable tab (see *Worktable tab - equip the worktable on p. 58)*.

The Procedure list (section 2) is displayed on the left-hand side of the Procedure tab. It shows the procedure as a list of commands, in the order in which they will be executed.

The Parameter section (section 3) is displayed in the bottom right section of the Procedure tab. It shows the parameters for the command which is currently selected in section 2. You can edit these parameters.

The Commands section (section 4) is displayed on the left-hand side under the Procedure list. It contains icons for all the commands you can use to define a procedure.

5.6.3.1 Overview of the available commands

All available commands are displayed as icons in the Commands section under the Procedure list.

This section gives you only a brief overview of the commands. Details on all commands and their parameters are included in the reference list (see *Reference list of commands and parameters on p. 73)*.

The following commands are available for defining a procedure.

Number of Samples: Use the **Number of Samples** command to specify how many samples are to be processed in the subsequent steps of the procedure. The command can be used several times in a method to change the number of samples during the sequence of the procedure.

Sample Transfer: Use the **Sample Transfer** command to transfer samples from different locations of the source tube labware to different locations of the destination tube labware.

Reagent Transfer: Use the **Reagent Transfer** command to transfer a reagent from one or different locations of the source tube labware to different locations of the destination tube labware.

Dilute: The **Dilute** command is a modified **Sample Transfer** command making it easier to carry out diluting series. A defined volume is transported from one well to the next several times by means of pipetting.

Pool: The **Pool** command is used to transfer liquids from several source tube locations to a single destination tube location. For example, the contents of several source tube labware wells can be pooled in a new destination tube labware well.

Pool One Destination: With the **Pool One Destination** command you can transfer liquids from several source tube locations to a single destination tube location. This command is a simplified **Pool** command.

Mix: Use the **Mix** command to mix liquids at one location.

Vacuum: Only on epMotion 5075 VAC. Use the **Vacuum** command to set the vacuum in the vacuum unit.

Transport: The **Transport** command uses the gripper to transport labware to another destination location or to the Mastercycler (epMotion 5075 MC) or to the vacuum unit (epMotion 5075 VAC). Tips, racks, thermoadapters and height adapters cannot be transported. Semi-skirted and unskirted PCR plates can only be transported in combination with the thermoblock.

Temperature: Only for epMotion 5075 with thermal module. The **Temperature** command is used to specify the temperature of a thermal module.

Thermomixer: Only for epMotion 5075 with thermomixer. With the **Thermomixer** command you can configure the temperature and speed of the thermomixer.

Wait: The **Wait** command is used to define a definite pause before the next step. The procedure continues automatically after the specified time has elapsed.

Comment: Use the **Comment** command to enter a comment line to be displayed at a specific location in the Procedure.

User Intervention: Use the **User Intervention** command to insert steps into your method which the user has to execute manually. The procedure only continues after the operator has confirmed the display message.

TempCycler: Only for epMotion 5075 MC. Use the **TempCycler** command to select the temperature for the cycler lid and/or for the cycler block before starting a cycler program.

StartCycler: Only for epMotion 5075 MC. With the **StartCycler** command you select a cycler program and specify the start. The **StartCycler** command must always be the last command of a method.

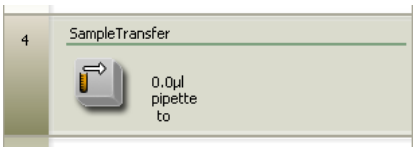
5.6.3.2 Adding a command to the program

To add a command to the program, proceed as follows.

1. To **insert** a command anywhere in the program (either in the procedure or at the end) click on the Command icon in the Command section in the Procedure tab, e.g., on the Sample Transfer icon, drag the command to the top and drop it in the desired procedure location.

2. To **append** a command to the end of the procedure, double-click on the command icon in the Command section in the Procedure tab, e.g., on the Sample Transfer icon.

   The command is added to the procedure.



   The command parameters are displayed in the Parameter section of the Procedure tab.

3. Click on the Parameters, Options, Mix and Liquid Type tabs in the Parameter section to edit the command parameters as required by your method (see *Editing the parameters and options of a command on p. 66)*.

   The example shows the **Sample Transfer** command. Other commands can have different options in the Parameter section in the Procedure tab. Details on all commands and their parameters are included in the reference list (see *Reference list of commands and parameters on p. 73)*.

4. Complete the procedure by adding other commands in the same way.

   In addition to adding commands in the ways described above, you can also move a command up or down within the procedure (see p. 65), copy a command including its parameters and options (see p. 66), or delete a command from the procedure (see p. 66).

5.6.3.3 Moving a command up or down in the procedure

To move a command to a different position in the procedure, proceed as follows.

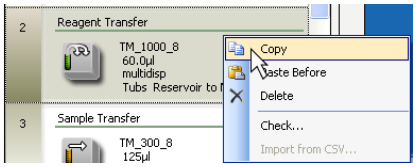
1. In the Procedure list of the Procedure tab click on the command you want to move, drag it up or down with the mouse and drop it at the new location.

   The command is moved to the new location.

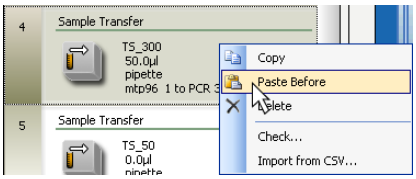
5.6.3.4 Duplicating a command

To duplicate a command, including its parameters and options, and insert the duplicate into the procedure, proceed as follows.

1. In the Procedure list of the Procedure tab select the original command and make sure that the parameters and options have been defined as necessary.
2. Click on the Copy icon, or right-click on the command and select Copy from the context menu.



3. Select the command **below** the position in which you want to insert the duplicate, right-click and select Paste before from the context menu.



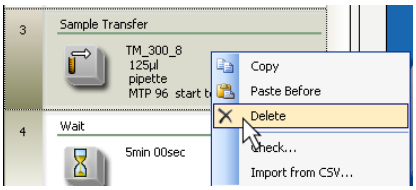
The command is duplicated and the duplicate is inserted at the chosen position.

You can now edit the parameters of the original command and the duplicate independently of each other.

5.6.3.5 Removing commands from the procedure

To remove one or several commands from the procedure, proceed as follows.

1. In the Procedure list of the Procedure tab select the command you want to remove.
2. To select a sequence of commands, click on the first command in the sequence, then press the **Shift** key on the keyboard and click on the last command in the sequence.
3. Press the **Del** key on the keyboard, or right-click on the command or sequence of commands and select Delete from the context menu.



A warning message appears.

4. To delete, click on OK.

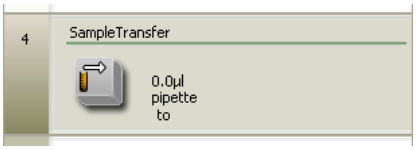
   The command or sequence of commands is removed from the procedure.

5.6.3.6 Editing the parameters and options of a command

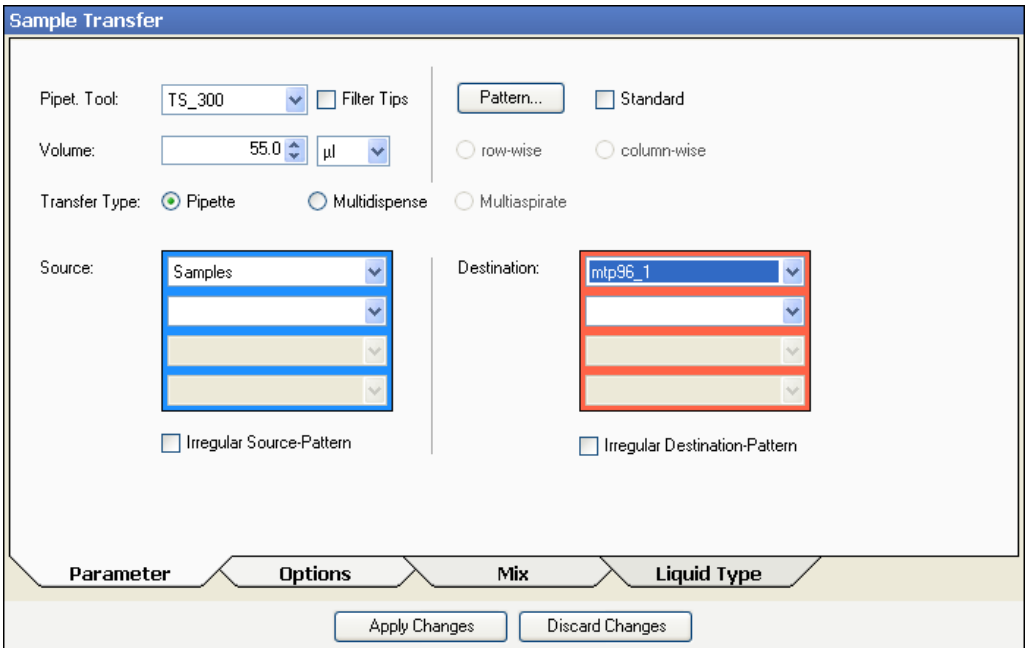
Each command has its own set of parameters, which you can edit at any time while you are creating or editing a procedure.

To edit the parameters and options for a command, proceed as follows.

1. In the Procedure list of the Procedure tab select the command you want to edit, e.g., a **Sample Transfer** command.



The command parameters are displayed in the Parameter section.



2. Select a dispensing tool from the Pipet. Tool list. If you are using filter tips, activate the Filter Tips option.
3. First set the volume to be dispensed (Volume) and select the Transfer Type (Pipette or Multidispense).
4. Select the source tube (Source) and the destination tube (Destination) for the command (see *Define the source tube (Source) and destination tube (Destination) for a transfer on p. 68).*
5. Specify the Pattern for the command (see *Editing the pattern for a Transfer command on p. 69)*
6. To specify further options for the command (e.g., Liquid Type, settings for mixing and changing tips), click on the Options, Mix and Liquid Type tabs in the Parameter section to edit the parameters according to the requirements of your method.
7. To discard the changes, click immediately on Discard Changes under the Parameter section **before** selecting a different command in the Procedure list.
8. To accept the changes, click on Apply Changes under the Parameter section or select a different command in the Procedure list.

The example shows the **Sample Transfer** command. Other commands may have different options in the Parameter section in the Procedure tab. For a detailed description of the available parameters and options for each command, see the reference list of commands (see *Reference list of commands and parameters on p. 73).*

5.6.3.7 Define the source tube (Source) and destination tube (Destination) for a transfer

You can define up to 4 source tube and destination tube locations for each **Transfer** command. To use labware as source or destination for a **Transfer** command the labware must first have been positioned on the worktable (see *Positioning labware on the worktable on p. 59)*.

Within one **Transfer** command you can define up to 4 labware locations for source tubes and up to 4 locations for destination tubes. The second and all further labware locations must be compatible with the first labware selected.

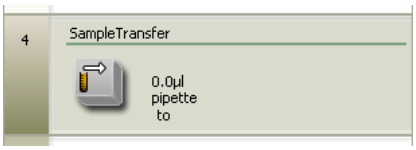
There are 2 options for defining source and destination tubes for a **Transfer** command:

- You can select source and destination tube labware from a list with labware objects positioned on the worktable (see p. 68).
- Immediately after adding a command to the procedure you can define a source and destination tube via mouse click (see p. 68).

Selecting source tube and destination tube from a list

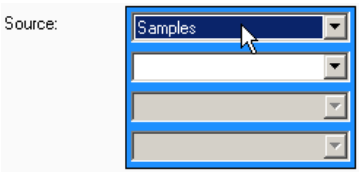
You can select up to 4 source tube and destination tube locations by selecting labware from a list of labware items positioned on the worktable. To do so, proceed as follows.

1. In the Procedure list of the Procedure tab select the command you want to edit, e.g., a **Sample Transfer** command.

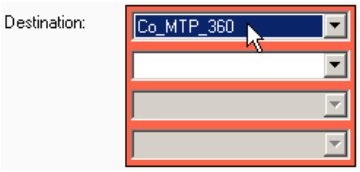


2. In the Parameter section select the first source tube labware from the list.

   The list for the next location becomes active automatically. The second list shows only labware on the worktable which is compatible with the first selected labware location.



3. Specify further source tube locations in the same way, if required.
4. Select the destination tube labware in the same manner.



The source tube and destination tube locations for this command are active immediately.

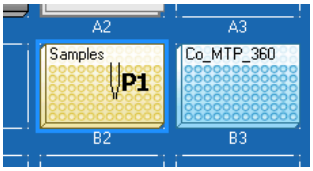
Clicking on source and destination with the mouse

You can define up to 4 source tube and destination tube locations by clicking with the mouse (only possible **immediately** after you have added the command to the procedure). To do so, proceed as follows.

1. Add a command to the procedure, e.g., a **Sample Transfer** command (see *Adding a command to the program on p. 65)*.
2. Immediately after adding the command, move the mouse over the worktable.

   The mouse pointer changes into a dispensing tool symbol.

3. Click on the first source tube labware on the worktable.

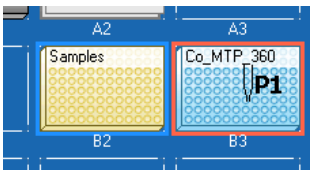


The selected source tube labware is highlighted in blue and the Source list in the Parameter section displays the name of the labware at the top.

4. If required, select further source tube locations by clicking with the mouse (up to 4 locations).

   They are also highlighted in blue and displayed as source tube locations in the Parameter section.

5. To define the destination tube labware, press the Ctrl key on the keyboard and keep it pressed while clicking on the first destination tube labware on the worktable.



The selected destination tube labware is highlighted in red and the Destination list in the Parameter section displays the name of the labware at the top.

6. If required, select further destination locations by holding the Ctrl key and clicking with the mouse (up to 4 locations).

   They are also highlighted in red and displayed as destination tube locations in the Parameter section.

   The source and destination locations for this command are active immediately. You can edit them later by selecting different locations from the lists in the Parameter section (see *Selecting source tube and destination tube from a list on p. 68)*.

5.6.3.8 Editing the pattern for a Transfer command

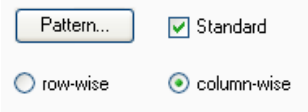
The following pattern types are available for **Transfer** commands:

- **Standard pattern** (only for **Sample Transfer** commands): A simple standard pattern which can be based on rows or columns.
- **Regular pattern with automatic pattern detection** (for all commands except when using module racks): a standard pattern which is not strictly based on rows or columns, e.g., for pipetting a sample from the first column of a source tube plate 1:1 to the second column of a destination tube plate. To define this pattern, you need to specify only the first few positions. The pattern is then recognized and completed automatically.
- **Irregular pattern** (for some commands (see *Reference list of commands and parameters on p. 73)*): irregular pattern for a plate or module rack in which the source tube and destination tube locations can be defined freely. Automatic pattern detection is not possible, all locations must be specified manually (see *Creating an irregular pattern for a plate or a rack on p. 71)*.

To edit the pattern for a **Transfer** command proceed as follows.

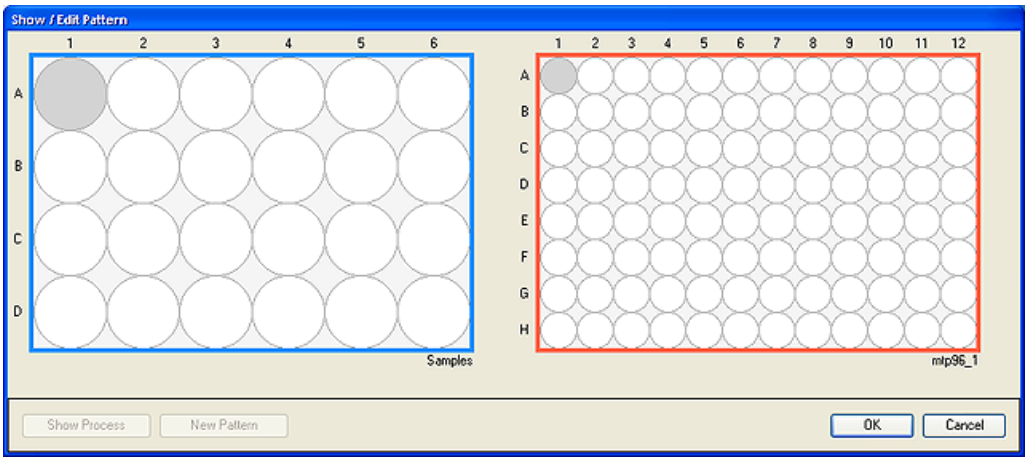
1. In the Procedure list of the Procedure tab select the command you want to edit (e.g., a **Sample Transfer** command) and define the source and destination tube labware (see *Define the source tube (Source) and destination tube (Destination) for a transfer on p. 68)*.

2. If the **Sample Transfer** command requires a standard pattern either by rows or columns, place a tick in the Standard checkbox and select the row-wise or column-wise option.

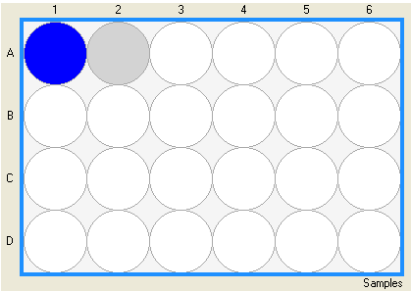


3. To define a regular pattern that is not row-wise or column-wise, click on the Pattern button. The Pattern window opens.

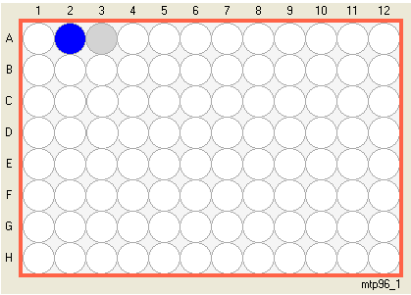
   The source and destination tube labware is displayed. The source tube labware is displayed on the left-hand side with a blue frame. The destination tube labware is displayed on the right-hand side with a red frame.



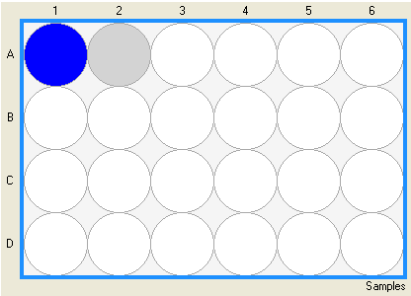
4. If there is a previous pattern that you do not want to use, click on the New Pattern button to remove it.
5. In the source tube labware click on the first location from which liquid is to be aspirated (e.g., location 1A).



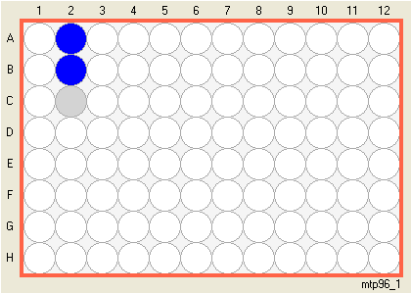
6. In the destination tube labware click on the location (or locations) to which the first liquid volume is to be transferred (e.g., location 2A).



7. In the source tube labware click on the second location from which liquid is to be aspirated (e.g., location 1B).



8. In the destination tube labware click on the location (or locations) to which the second liquid volume is to be transferred (e.g., location 2B).



epBlue will attempt to recognize the intended pattern and will highlight the next position in gray.

9. If the recognized pattern matches your requirements, click on OK to confirm and close the Pattern window. The pattern will be completed automatically up to the defined number of samples.
10. If you wish to discard the recognized pattern, click on New Pattern and start again.
11. To check a defined pattern, click on Show Process in the pattern window.

    The pattern sequence is displayed and the corresponding source and destination locations are displayed in the same color.

For a description of all available commands and their parameters, see the reference list of commands (see *Reference list of commands and parameters on p. 73)*.

Alternatively, you can create an irregular pattern for a plate or module rack (see *Creating an irregular pattern for a plate or a rack on p. 71)*.

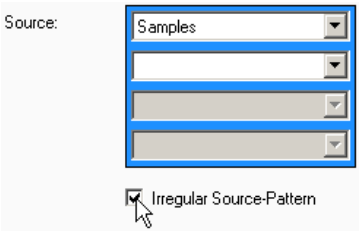
5.6.3.9 Creating an irregular pattern for a plate or a rack

An **irregular pattern** for a plate or module rack is a pattern in which the source and destination tube locations can be defined freely. Automatic pattern detection is not possible, all positions must be specified manually. Alternatively, you can define a **standard pattern** (row-wise or column-wise) or a **regular pattern with automatic pattern detection** (see *Editing the pattern for a Transfer command on p. 69)*.

To create an irregular pattern for a plate, rack or module rack, proceed as follows.

1. In the Procedure list of the Procedure tab select the command you want to edit (e.g., a **Sample Transfer** command) and define the source and destination tube labware (see *Define the source tube (Source) and destination tube (Destination) for a transfer on p. 68)*.

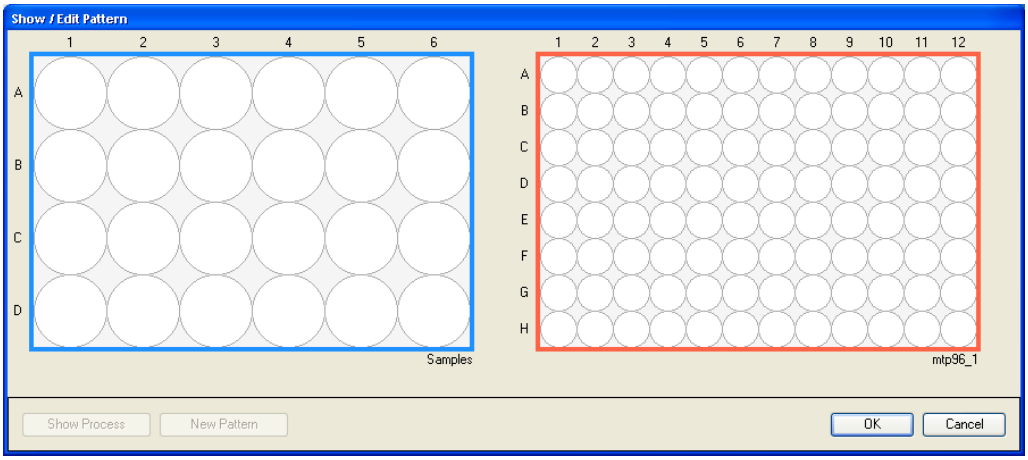
2. In the **Parameter** section in the **Irregular Pattern** checkbox under the list with the source and/or destination tube labware place a tick as required.



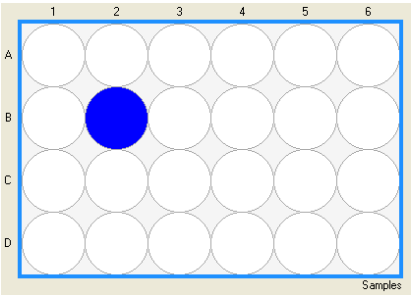
3. Click on the **Pattern** button.

   The Pattern window opens.

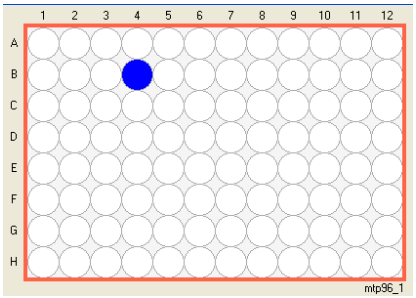
   The source and destination tube labware is displayed. The source tube labware is displayed on the left-hand side highlighted in blue. The destination tube labware is displayed on the left-hand side highlighted in red.



4. In the source tube labware click on the first location from which liquid is to be aspirated.



5. In the destination tube labware click on the location to which the first liquid volume is to be transferred.



6. Select all locations of the intended pattern in the same way, alternating between source tube and destination tube labware.
7. To confirm the pattern and close the Pattern window, click on OK.
8. If you wish to discard the pattern, click on New Pattern and start again.
9. To check a defined pattern, click on Show Process in the pattern window.

   The pattern sequence is displayed and the corresponding source and destination tube locations are displayed in the same color.

For a description of all available commands and their parameters, see the reference list of commands (see *Reference list of commands and parameters on p. 73)*.

5.6.3.10 Checking the method or individual commands (parameter test)

The parameter test allows you to check whether all required parameters are set, either for the entire method or for individual commands or a sequence of commands.

1. To check the parameter settings of the current method, click on the Check Method icon in the toolbar of the Work (see p. 54) tab or select Edit - Check Method from the main menu.
2. To check an individual command or a sequence of commands, select the commands you wish to check, right-click and select Check from the context menu, or select Edit - Check Commands from the main menu.

   A message window opens to inform you if a parameter error was found. Correct the error and repeat the check until all errors have been corrected.

5.6.3.11 Importing commands from a CSV file

When working with biological material (e.g., protein solutions, nucleic acid solutions), it may be necessary to transfer defined quantities of different samples from various parent solutions to a target container in order to adjust the concentration (thus creating standards). The quantities of sample material that must be transferred can be determined by physical measurements (e.g., by using spectroscopic methods, enzymatic analysis, or chemical methods), and the resulting quantities can then be listed in a table.

- To import a table in CSV file format, select Edit - Import from CSV from the menu.

  For details, please refer to the appendix (see *Importing commands from a CSV file on p. 238)*.

5.6.4 Reference list of commands and parameters

This reference list contains all available commands and their parameters and options. Further details and specialized information can be found in the appendix.

You can use these commands to define a procedure (see *Procedure tab - defining a procedure on p. 62)*.

5.6.4.1 General configurations for Transfer commands

The following general parameters and options are used for **Transfer** commands. Click on the Parameters, Options, Mix and Liquid Type tabs in the Parameters section to edit the command parameters as required by your method.

Some parameters may differ or may not be available for individual commands. In this case please find additional details in the section about the corresponding **Transfer** command: **Sample Transfer** (see p. 75), **Reagent Transfer** (see p. 75), **Dilute** (see p. 76), **Pool** (see p. 76) and **Pool One Destination** (see p. 77).

Parameter

- Pipet. Tool / Filter Tips: select the dispensing tool you want to use from the list. If you are using filter tips, activate the Filter Tips option.

- Volume: enter the volume to be transferred in each step. The volume is aspirated or dispensed according to the transfer types specified below.
- Transfer type
  - Pipette: the volume set above is aspirated or dispensed in each step.
  - Multidispense: the volume set above is dispensed in each multidispense step.
  - Multiaspirate: the volume set above is aspirated in each multiaspirate step.
- Source/Destination: select the source tube labware and destination tube labware from the worktable allocation (see *Define the source tube (Source) and destination tube (Destination) for a transfer on p. 68)*.
- Pattern: the pattern is used to specify aspiration and dispensing locations within this command.
  - Standard pattern: if the command requires a standard pattern that is either row-wise or column-wise, check the Standard checkbox and select the row-wise or column-wise option.
  - Regular pattern with automatic pattern detection: to define a regular pattern that is not row-wise or column-wise, click on the Pattern button and define the intended pattern (see *Editing the pattern for a Transfer command on p. 69)*.
  - Irregular pattern: to create an irregular pattern for a plate or a module rack, check the Irregular Pattern checkbox below the list of source and/or destination tube labware as required. Then click on the Pattern button and define the intended pattern (see *Creating an irregular pattern for a plate or a rack on p. 71)*.

Options

- Aspirate from bottom: select if the liquid is to be aspirated from the bottom of the well.
- Elution from filter: select if the liquid is to be aspirated from a PCR Cleanup filter plate.
- Dispense from top: select if the liquid is to be dispensed from the top edge of the well.
- Change tips: select one of the available options to specify when the tips are to be changed.

Mix

- Mix before aspirating / Mix after dispensing: activate the relevant option if the liquid is to be mixed before aspiration or after dispensing. To mix the liquid, it will be aspirated into the tip and dispensed back into the same well.
- No. of cycles: set the required number of mixing cycles.
- Speed: set the mixing speed.
- Volume: set the volume that is to be aspirated and dispensed during the mixing process.
- Fixed height: activate this option if you wish to use fixed height positions for mixing, and set the height values for aspiration and dispensing. The height is measured between the tip and the bottom of the well.

  This option should only be used with filling levels below the volume of the well. With greater filling volumes, liquid can be forced out of the tube or well!

Liquid Type

- Standard Liquid Type: select the liquid type which most closely resembles the physical properties of the liquid you want to transfer.
- Change Parameters: to change the settings for the selected liquid type for this command, activate this option and set the values according to your requirements.

  To restore the default settings for the selected liquid type, click the Set Default button.

5.6.4.2 Number of Samples

Use the **Number of Samples** command to specify how many samples are to be processed in the subsequent steps of the procedure. It applies to all commands until the next **Number of Samples** command in the procedure. The command can be used several times in a method to change the number of samples during the sequence of the procedure.

Dependent on the type and purpose of the following commands, the **Number of Samples** command has different effects:

- Sample Transfer: number of samples picked up by the source tube plate.
- Reagent Transfer: number of wells of the destination tube plate into which the reagent is dispenses.
- Dilute: number of samples to be diluted.
- Pool and **Pool One Destination**: Number of wells in the source tube plate from which liquid is aspirated.
- Mix: number of wells in the plate in which the liquid is mixed.

Parameter

- Fix Number of Samples / (Max) Number of Samples: to define a fixed number of samples for all runs of this method, activate the Fix Number of Samples option and enter the required number. The specified number of samples will then be used for all method runs.

  To use a variable number of samples, deactivate the Fix Number of Samples option and enter the maximum number of samples. The exact number of samples for each individual method run must then be entered by the operator when the method starts.
- Comment: enter a comment, if required. The comment will be displayed at the start of the method.

5.6.4.3 Sample Transfer

Use the **Sample Transfer** command to transfer samples from different locations of the source tube labware to different locations of the destination tube labware. During the **Sample Transfer** each sample is transferred in accordance with a defined pattern from its original well in the source tube plate to a defined well in the destination tube plate.

This command requires the general parameters for **Transfer** commands (see *General configurations for Transfer commands on p. 73)*. The following details are specific for this command.

Parameter

- Transfer type
  - Pipette: the volume set above is aspirated or dispensed in each step.
  - Multidispense: the volume set above is dispensed in each multidispense step.
  - Multiaspirate: not available.

5.6.4.4 Reagent Transfer

Use the **Reagent Transfer** command to transfer samples from a location in the source tube labware to different locations in the destination tube labware. During the reagent transfer, the reagent is taken from its tube or well in the source tube labware and dispensed into various specified wells in the destination tube plate, according to the defined pattern.

This command requires the general parameters for **Transfer** commands (see *General configurations for Transfer commands on p. 73)*. The following details are specific for this command.

Parameter

- Transfer type
  - Pipette: the volume set above is aspirated or dispensed in each step.
  - Multidispense: the volume set above is dispensed in each multidispense step.
  - Multiaspirate: not available.
- Pattern: the pattern is used to specify aspiration and dispensing positions within this command.

- Standard pattern: not available.
- Regular pattern with automatic pattern detection: to define a regular pattern that is not row-wise or column-wise, click on the Pattern button and define the intended pattern (see *Editing the pattern for a Transfer command on p. 69)*.
- Irregular pattern: to create an irregular pattern for a plate or a module rack, check the Irregular Pattern checkbox below the list of source and/or destination tube labware as required. Then click on the Pattern button and define the intended pattern (see *Creating an irregular pattern for a plate or a rack on p. 71)*.

5.6.4.5 Dilute

The **Dilute** command is a modified **Sample Transfer** command making it easier to carry out diluting series. A defined volume is transported from one well to the next several times by means of pipetting.

This command requires the general parameters for **Transfer** commands (see *General configurations for Transfer commands on p. 73)*. The following details are specific for this command.

Parameter

- Transfer type
  - Pipette: the volume set above is aspirated or dispensed in each step.
  - Multidispense: not available.
  - Multiaspirate: not available.
- Pattern: the pattern is used to specify aspiration and dispensing locations within this command.
  - Standard pattern: not available.
  - Regular pattern with automatic pattern detection: to define a regular pattern that is not row-wise or column-wise, click on the Pattern button and define the intended pattern (see *Editing the pattern for a Transfer command on p. 69)*.
  - Irregular pattern: Only available for the source tube location. To create an irregular pattern for a source tube plate or a module rack, check the Irregular Pattern checkbox below the list of source and/or destination tube labware. Then click on the Pattern button and define the intended pattern (see *Creating an irregular pattern for a plate or a rack on p. 71)*.

Options

- Aspirate from bottom: select if the liquid is to be aspirated from the bottom of the well.
- Elution from filter: not applicable.
- Dispense from top: select if the liquid is to be dispensed from the top edge of the well.
- Change tips: select one of the available options to specify when the tips are to be changed.

5.6.4.6 Pool

The **Pool** command is used to transfer liquids from several source tube locations to a single destination tube location. For example, the contents of several source tube labware wells can be pooled in a new destination tube labware well.

This command requires the general parameters for **Transfer** commands (see *General configurations for Transfer commands on p. 73)*. The following details are specific for this command.

Parameter

- Transfer type
  - Pipette: the volume set above is aspirated or dispensed in each step.
  - Multidispense: not available.
  - Multiaspirate: the volume set above is aspirated in each multiaspirate step.

- Pattern: the pattern is used to specify aspiration and dispensing locations within this command.
  - Standard pattern: not available.
  - Regular pattern with automatic pattern detection: to define a regular pattern that is not row-wise or column-wise, click on the Pattern button and define the intended pattern (see *Editing the pattern for a Transfer command on p. 69)*.
  - Irregular pattern: not available.

Options

- Aspirate from bottom: select if the liquid is to be aspirated from the bottom of the well.
- Elution from filter: not applicable.
- Dispense from top: select if the liquid is to be dispensed from the top edge of the well.
- Change tips: select one of the available options to specify when the tips are to be changed.

5.6.4.7 Pool One destination

With the **Pool One Destination** command you can transfer liquid from several source tube locations into a single destination tube location. This command is a simplified **Pool** command.(see *Pool on p. 76)*

This command requires the general parameters for **Transfer** commands (see *General configurations for Transfer commands on p. 73)*. The following details are specific for this command.

Parameter

- Transfer type
  - Pipette: the volume set above is aspirated or dispensed in each step.
  - Multidispense: not available.
  - Multiaspirate: the volume set above is aspirated in each multiaspirate step.
- Pattern: the pattern is used to specify aspiration and dispensing locations within this command.
  - Standard pattern: not available.
  - Regular pattern with automatic pattern detection: to define a regular pattern that is not row-wise or column-wise, click on the Pattern button and define the intended pattern (see *Editing the pattern for a Transfer command on p. 69)*.
  - Irregular pattern: Only available for the source tube location. To create an irregular pattern for a source tube plate or a module rack, check the Irregular Pattern checkbox below the list of source and/or destination tube labware. Then click on the Pattern button and define the intended pattern (see *Creating an irregular pattern for a plate or a rack on p. 71)*.

Options

- Aspirate from bottom: select if the liquid is to be aspirated from the bottom of the well.
- Elution from filter: not applicable.
- Dispense from top: select if the liquid is to be dispensed from the top edge of the well.
- Change tips: select one of the available options to specify when the tips are to be changed.

5.6.4.8 Mix

Use the **Mix** command to mix liquids at one location. To mix the liquid, it will be aspirated into the tip and dispensed back into the same well.

Parameter

- No. of cycles: set the required number of mixing cycles.
- Speed: set the mixing speed.
- Tool / Filter Tips: select from the list the dispensing tool you want to use. If you are using filter tips, activate the Filter Tips option.
- Mixing Volume: set the volume that is to be aspirated and dispensed during the mixing process.
- Fixed height: activate this option if you wish to use fixed height positions for mixing, and set the height values for aspiration and dispensing. The height is measured between the tip and the bottom of the well.

  This option should only be used with filling levels below the volume of the well. With greater filling volumes, liquid can be forced out of the tube or well!
- Racks: select the labware from the worktable assignment.
- Pattern: the pattern is used to specify mixing positions within this command.
  - Regular pattern with automatic pattern detection: click on the Pattern button and define the intended pattern.
  - Irregular pattern: To create an irregular pattern place a tick in the Irregular Pattern checkbox under the Racks list. Then click on the Pattern button and define the intended pattern.

Options

- Liquid Type: select the Liquid Type which most closely resembles the physical properties of the liquid you want to mix.
- Change tips: select one of the available options to specify when the tips are to be changed.

5.6.4.9 Vacuum (epMotion 5075 VAC)

Only on epMotion 5075 VAC. Use the **Vacuum** command to set the vacuum in the vacuum unit.

Parameter

- Frame: select the Vac Frame.
- Vacuum Pressure: set the vacuum pressure in kPa or mbar.
- Vacuum time: set the time for extraction.
- Use Vacuum Lid: activate this option if you want to use the Vac Lid. At the start of the command, the gripper transports the Vac Lid from location T0 to the filter plate in the vacuum unit.
- Check levels: activate this option if all wells of the filter plate are to be scanned by the Optical Sensor following application of the vacuum. Check Levels must not be preceded by a dispensing command.

5.6.4.10 Transport (epMotion 5075)

The **Transport** command uses the gripper to transport labware to another destination location or to the Mastercycler (epMotion 5075 MC) or to the vacuum unit (epMotion 5075 VAC). Tips, racks, thermoadapters and height adapters cannot be transported. Semi-skirted and unskirted PCR plates can only be transported in combination with the thermoblock.

Parameter

- Labware: select the labware to be transported.
- To Location: select the destination location for the transport.

5.6.4.11 Temperature (epMotion 5075 with temperature control unit)

The **Temperature** command is used to specify the temperature of a thermal module.

Parameter

- Location: select a thermal module.
- Temperature on: switch on temperature-control.
- Hold Temperature: activate this option if the selected thermal module should hold the target temperature after the method has been performed.
- Temperature: set a temperature between 0°C and 110°C.

If you want to switch of the temperature control before the end of the method, insert a different **Temperature** command at the appropriate position in the procedure and deactivate the parameter Temperature On in this second **Temperature** command.

5.6.4.12 Thermomixer (epMotion 5075 with Thermomixer)

With the **Thermomixer** command you can define the temperature and mixing configurations for the thermomixer.

Parameter

- Template: optionally you can choose precast templates for different mix functions.
- Save: you can save your own templates.
- Speed on: activate the checkbox if you want to mix.
  - Speed: set a speed between 300 – 2000 rpm.
  - Time: set a time between 30 s and 120 min.
- Temperature on: activate the checkbox if you want to set a temperature.
  - keep temperature after method run: activate this checkbox, if you want to hold the temperature after the method run.
  - Temperature: set a temperature between 4°C and 95°C.

If you want to switch of the temperature control before the end of the method, insert a different **Thermomixer** command at the appropriate position in the procedure and deactivate the parameter Temperature On in this second **Thermomixer** command.

The Thermomixer can reach a minimal temperature of 15°C below the actual room temperature.

5.6.4.13 Wait

The **Wait** command defined a definite pause before the next step. The procedure continues automatically after the specified time has elapsed.

Parameter

- Wait Time: set the duration of the pause.
- Wait for Temperature / Location: activate this option if the epMotion 5075 should wait until the target temperature at a location has been reached, and select the location from the list.

5.6.4.14 Comment

Use the **Comment** command to enter a comment line to be displayed at a specific location in the Procedure.

- Comment: enter the text for the comment.

5.6.4.15 User Intervention

Use the **User Intervention** command to insert steps into your method which the user has to execute manually. The procedure only continues after the operator has confirmed the display message.

- Comment: enter an informative comment to tell the operator what task he or she needs to carry out.
- Alarm: activate this option for an alerting signal when this step in the procedure is reached.

5.6.4.16 Temp Cycler (epMotion 5075 MC)

Only for epMotion 5075 MC. Use this command to select the temperature for the cycler lid and/or for the cycler block before starting a cycler program.

- **Lid Temperature On** / **Lid Temperature**: activate this option to set a temperature for the cycler lid and enter the temperature.
- **Block Temperature On** / **Block Temperature**: activate this option to set a temperature for the cycler block and enter the temperature.

5.6.4.17 Start Cycler (epMotion 5075 MC)

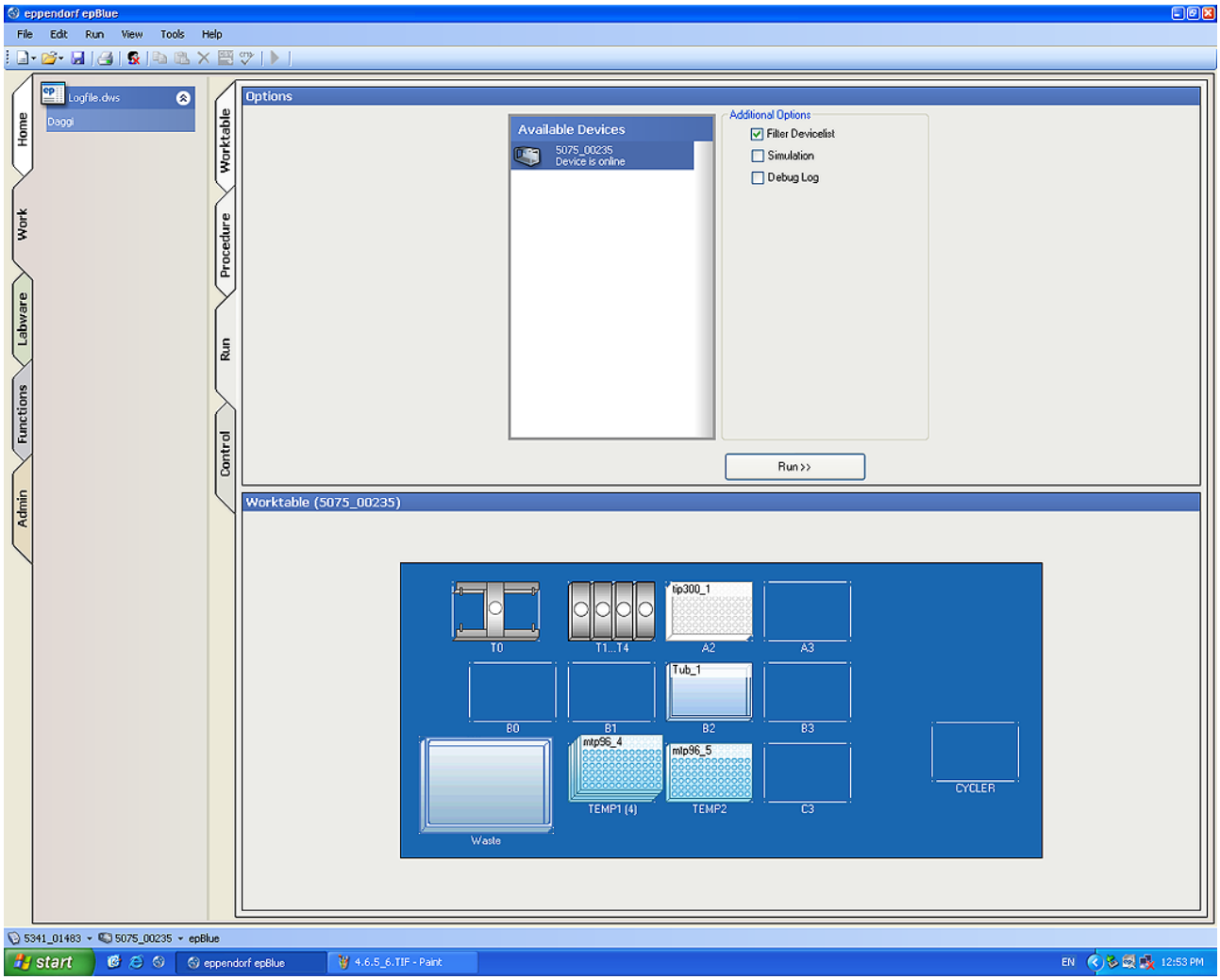
Only for epMotion 5075 MC. Use this command to select a cycler program and specify the start. The StartCycler command must always be the last command of a method.

- **Cycler Program**: select the cycler program.

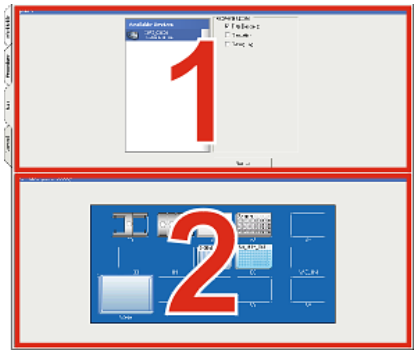
5.6.5 The Run tab

With the Run tab you can start a method on one or several devices available in your system.

To go to the Run tab select the Work tab on the left-hand side of the program window and select the Run tab.



The Run tab is divided into 2 sections.

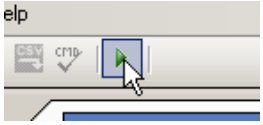


The **Options section** (section 1) is displayed in the top part of the Run tab. It guides you through the starting process step by step and allows you to enter additional parameters and select the required options for the method run.

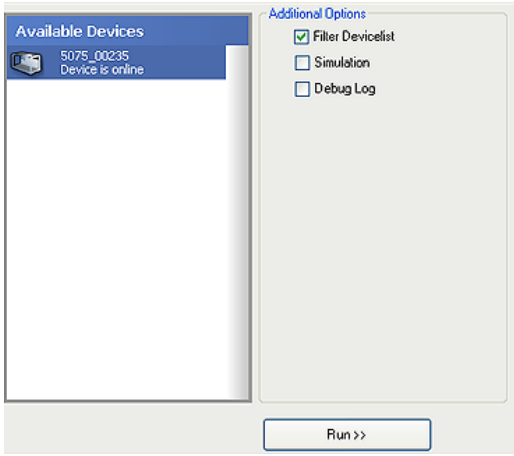
The **Worktable** (section 2) is displayed in the bottom part of the Run tab. It shows the worktable assignment for the active method and allows you to check the labware for the method. You cannot edit the worktable here; To do so you need to change to the Worktable tab (see *Worktable tab - equip the worktable on p. 58)*.

To start a method, proceed as follows.

1. Open the method (see *Opening an application on p. 43)*.
2. Change to the Run tab or, while the Worktable or Procedure tabs are active, click on the Start Method icon.



The Options section in the Run tab displays a list of devices in your system. To display only devices which are currently available and suitable for the selected method, activate the Filter Devicelist option.

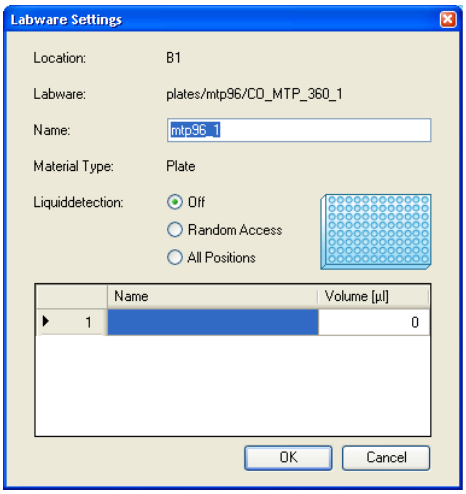


3. Select the device you want to use and click on Run.

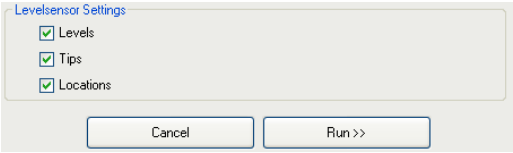
   If the number of samples is defined as variable for any step in the procedure, a window opens in which the actual number of samples for the current run of the method must be entered manually. The number of samples request does not appear in methods with a fixed number of samples.

4. Enter the number of samples and click on OK. If required, enter the number of samples for further commands in the same way.
5. Check the supply of the worktable of the device and make sure that it matches the worktable assignment defined for the method (as displayed in the Worktable section of the Run tab).
6. To edit labware-specific settings for level sensor and volumes, double-click on the labware in the Worktable section.

The Labware Settings window opens.



7. Change the settings as required, and click on OK. Edit the settings for other labware in the same way, if required.
8. Under Level Sensor Settings in the Options section define the level sensor settings for this method run.

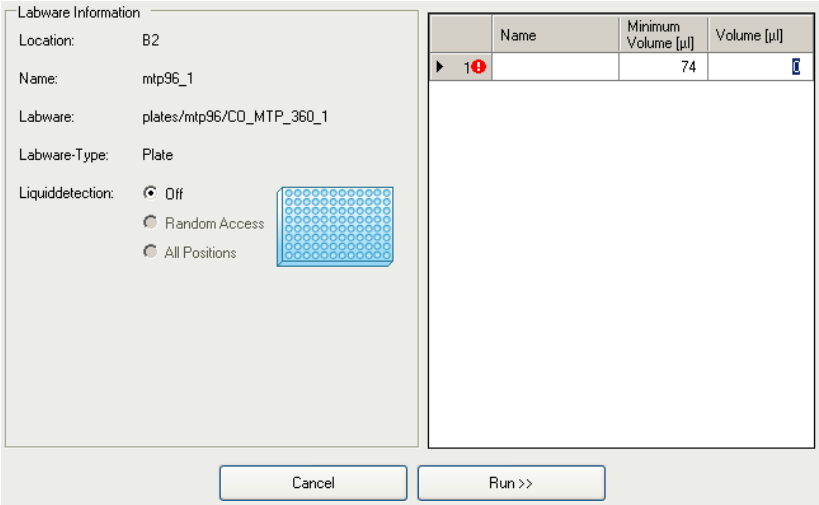


The following options are available:

- Levels: check the liquid levels according to the settings defined for the individual labware items.
- Tips: check the type and quantity of tips in the tip rack.
- Locations: check that the labware is positioned correctly on the worktable, as specified in the method.

The options you select here only apply to this particular method run. To define the general level sensor settings use the function **Optical Sensor** in Functions tab (see *Optical sensor on p. 102)*.

9. If liquid detection is switched off for the method or for individual labware components, the next steps display the labware information for each component, where the volume settings must be entered manually.



10. Enter the current volume and click on **Run**. If required, enter the volumes for other labware in the same way.

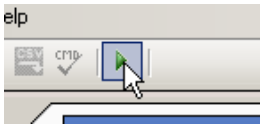
    The method starts and the display changes to the **Control** tab(see *The Control tab on p. 87)*.

5.6.5.1 Simulation

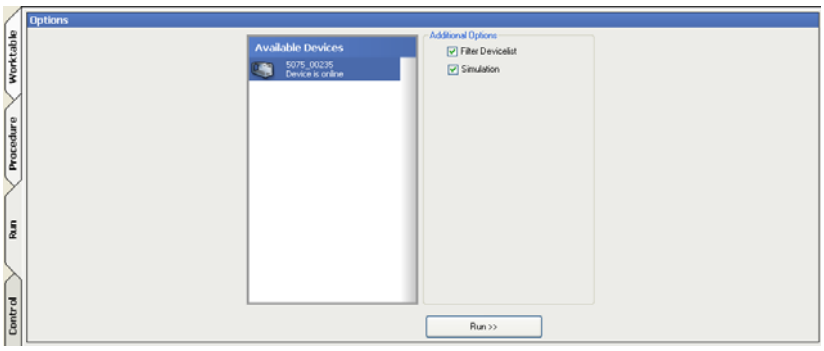
Before you start your method, you have the ability to simulate the process.

To simulate a method, proceed as follows.

1. Open the method (see *Opening an application on p. 43)*.
2. Change to the **Run** tab or click with the tabs **Worktable** or **Procedure** active on the **Start Method** icon.



The **Options** section in the **Run** tab displays a list of devices in your system. To display only devices which are currently available and suitable for the selected method, activate the **Filter Devicelist** option.

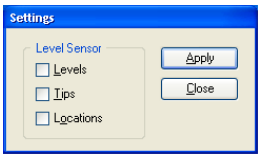


3. Select the device you want to use, click on **Simulation** and click on **Run**.

If the number of samples is defined as variable for any step in the procedure, a window opens in which the actual number of samples for the current simulation of the method must be entered manually. The number of samples request does not appear in methods with a fixed number of samples.

4. Enter the number of samples and click on OK. If required, enter the number of samples for further commands in the same way.
5. Specify the level sensor settings for the simulation. Click on Apply when you change the settings or click on Close when you don´t change the settings.

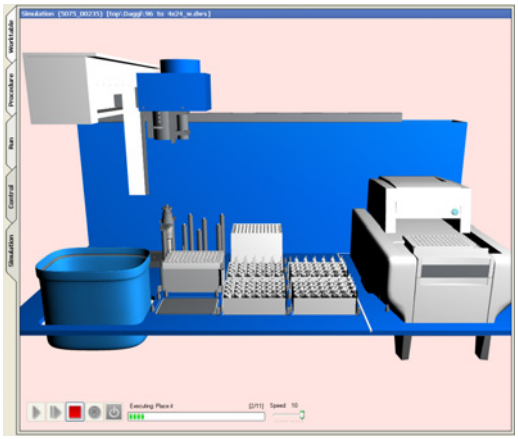
   The simulation starts in the Simulation tab.



Only one simulation can start per client. To start a new simulation you have to close the last simulation first. To exit epBlue the simulation must be close.

Controlling the simulation

If you start a simulation, the Simulation tab opens.



The Control icons allow you to control the simulation. The following options are available.

You can vary the speed of the simulation from real time (Value 1) to ten fold faster by moving the speed needle with the mouse.

Start: to continue the simulation. The simulation will resume until the end, or until you stop it again

Steps: to carry out the simulation step by step. The simulation will perform the next step or action, and will then stop again.

Stop: to interrupt the simulation. The simulation will stop at the current step or action and wait for further instructions. The other Control icons become active.

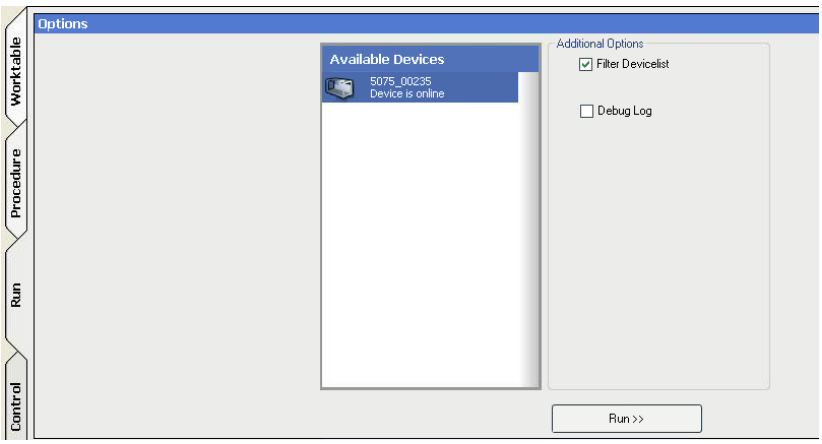
Abort: to abort the simulation.

Exit: to exit the simulation. The Simulation tab is closed. Now you can start another simulation or exit epBlue.

5.6.5.2 Debug log

The debug log can only be recorded by the administrator and is required only if the Eppendorf Service team needs more information in the event of any faults occurring.

As administrator, you also have the option at the start of a method of recording a debug log for this method run. The debug log records detailed information about the method run in question.



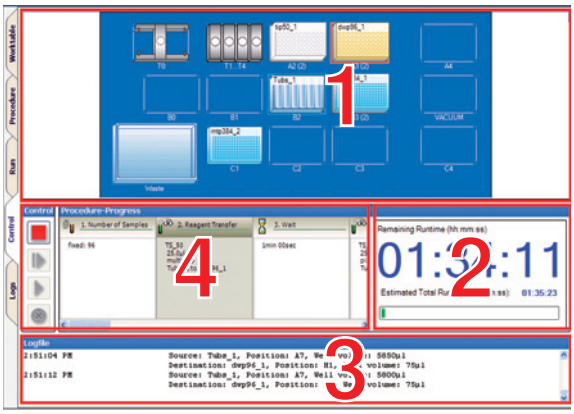
1. Before starting the method, click on the Debug Log checkbox.
   The checkbox then contains a tick.
2. Then start the method as usual.
   Recording the debug log can cause the method run to proceed more slowly.
3. The debug log can be viewed and printed out from the Logs tab.

5.6.6 The Control tab

In the Control tab you can monitor and control the devices on which your methods are currently running.

epBlue automatically changes to the Control tab if you have started a method via the Run tab (see *The Run tab on p. 81)*.

The Control tab is divided into 3 sections.



The Worktable section (section 1) is displayed in the top part of the Control tab. While the method is running, it shows the status of the worktable at the current step in the procedure.

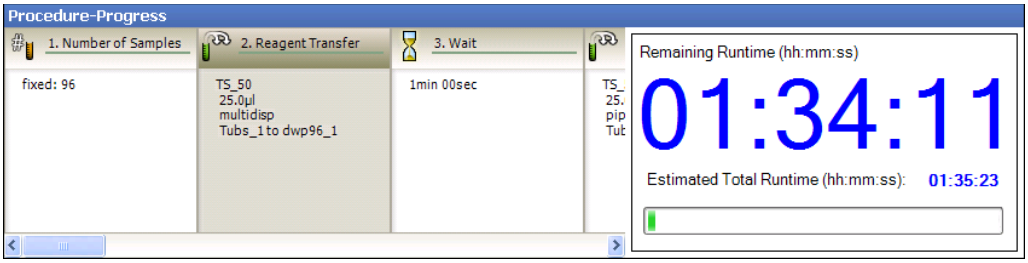
The runtime section (section 2) displays the predicted remaining runtime until the end of the application.

The Logfile section (section 3) displays the logfile which records every step in the procedure and provides detailed information on the current status of the run.

The Procedure Progress section (section 4) is displayed in the center of the Control tab. It highlights the current step in the procedure and displays some information on the command that is being carried out. The **Control icons** on the left-hand side allow you to pause, to carry out the method step by step, or to abort the run.

5.6.6.1 Controlling the method run

Whilst the method is running the current command is highlighted in the `Procedure Progress` section.



The Control icons allow you to control the method run. The following options are available.

Stop: to stop the method run. The device will stop at the current step or action and wait for further instructions. The other Control icons become active.

Steps: to carry out the method step by step. The device will perform the next step or action in the method, and will then stop again.

Start: to continue the method run. The device will resume the method run until the end, or until you stop it again.

Abort: to abort the method run. The device will abort the method run and return to its initial state.

5.6.6.2 Reading logfiles

A logfile is generated automatically when a method is started. The logfile precisely records every step of the process.

You can view and print the logfiles and the method description (see *Printing applications and logfiles on p. 56)*.

Example: Extract from a logfile - Sample Transfer

```
13 11:07:53 2 SampleTransfer 0x0000 SRC-ID = 3 Name = PCR96TwinTec Labware = ./
top\dws\plates/PCR96\EP_TT_PCR_150
14 11:07:53 2 SampleTransfer 0x0000 DES-ID = 6 Name = FILTER96 Labware = ./top\dws\plates/
FILTER96\EP_Cleanup_FP
15 11:07:53 2 SampleTransfer 0x0000 Samples= 96 Replicates= 1
16 11:07:53 2 SampleTransfer 0x0000 Tool = ./top\dws\tools/TM_300_8
17 11:07:53 2 SampleTransfer 0x0000 Liquid = ./top\dws\liquids/water
18 11:07:53 2 SampleTransfer 0x0000 Volume = 50 Transfer type=pip Change tips=bafn
19 11:08:23 2 SampleTransfer 0x0000 SMP 1.1 SRC 3.0 VOL 60 DES 6.0 VOL 0
20 11:08:49 2 SampleTransfer 0x0000 SMP 9.1 SRC 3.1 VOL 60 DES 6.1 VOL 0
21 11:09:16 2 SampleTransfer 0x0000 SMP 17.1 SRC 3.2 VOL 60 DES 6.2 VOL 0
22 11:09:43 2 SampleTransfer 0x0000 SMP 25.1 SRC 3.3 VOL 60 DES 6.3 VOL 0
```

5.7 The Labware tab

5.7.1 Overview of the Labware tab

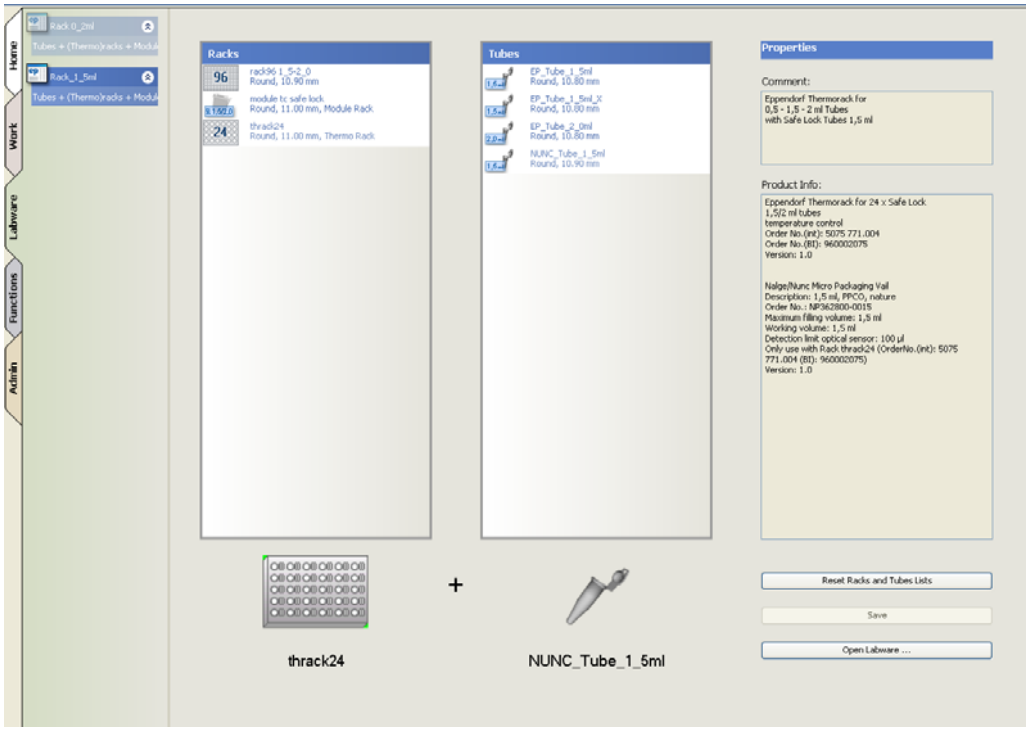
This tab is only displayed if you are logged in as a member of a user group with the necessary user rights.

If the Labware tab is empty when opened, you first have to open the labware via the Home tab (see *The Home tab on p. 40)* or the file window (see *The file window on p. 42)*.

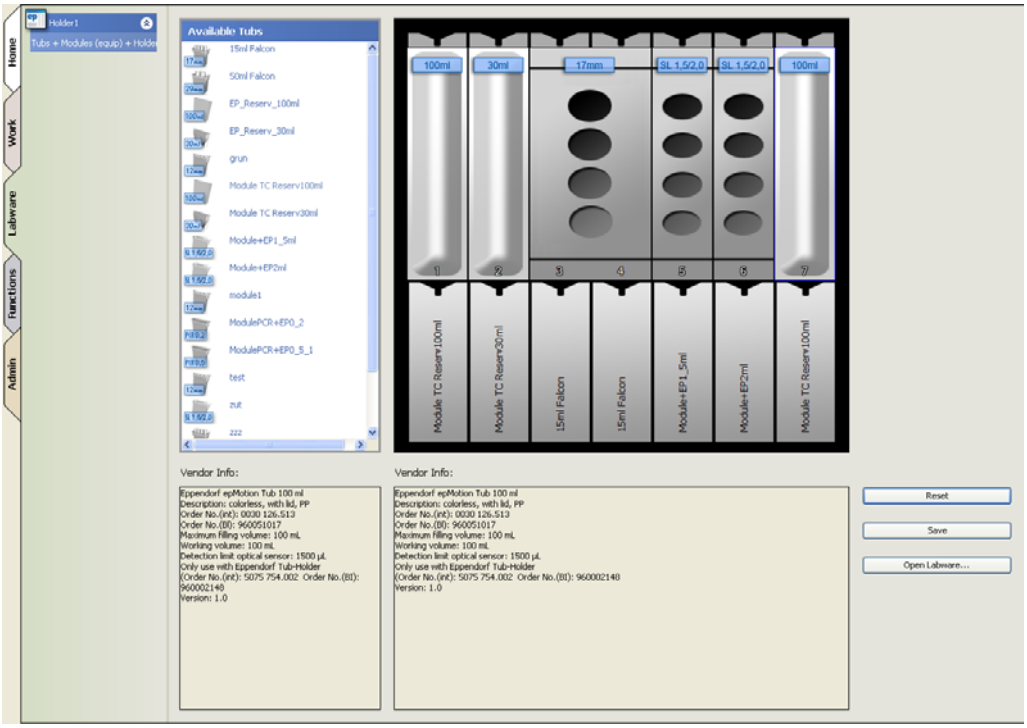
epBlue automatically changes to the Labware tab if you have opened labware via the Home tab or the file window. You can access the empty Labware tab also through a mouse click. With the Labware tab you can compile labware for use in yours system and, provided you have the necessary access rights, can create and edit your own labware combinations.

Generally the Labware tab contains the following two editing modes.

If you edit a **Rack and tube combination** or a **Module rack and tube combination** the Labware tab displays lists with the available racks, module racks and tubes from which you can select the labware components.

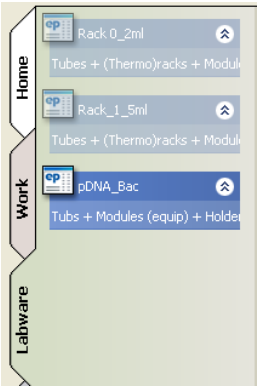


If you fill a **Reservoir rack** the Labware tab displays the reservoir rack and you can move different reservoirs and filled module racks into the rack via Drag-and-Drop.



5.7.1.1 List of open labware

On the left-hand side of the Labware tab a list with all open labware is displayed. Several labware items can be open at the same time and can be edited in parallel. The current labware is highlighted in darker blue. To switch between the items, click on the labware names in the list.



5.7.1.2 Icons in the Labware tab

In the Labware tab the following icons are available in the toolbar under the main menu.

- New... New Application: to create a new application for editing
- Open... Open Application / Open Labware: to open an existing application or labware
- Save: to save changes to applications or labware
- Print: to print a report
- Logout: to log out of your user account and exit the software

Alternatively, these functions are also available in the File menu.

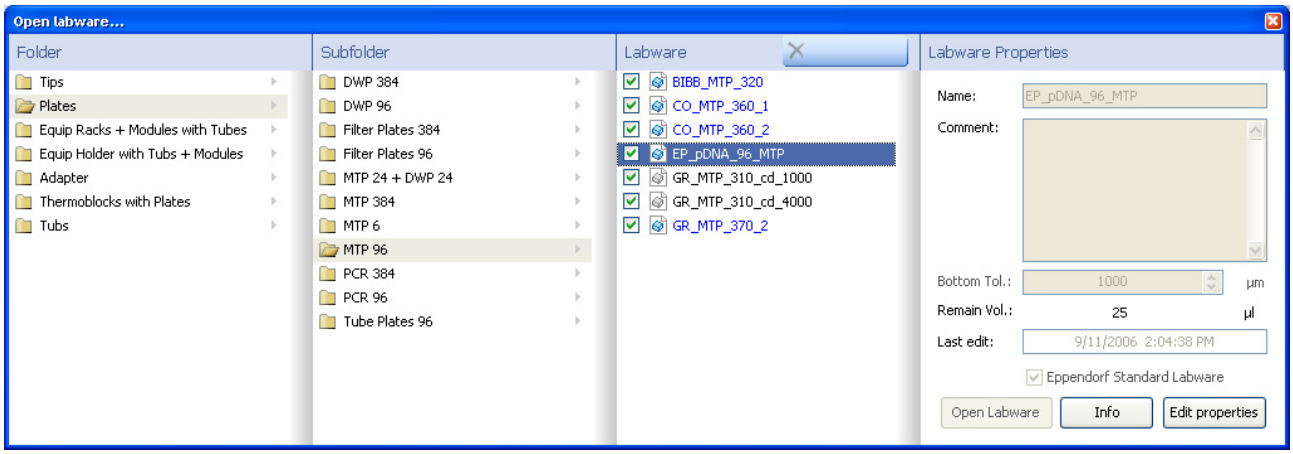
5.7.2 Activate or deactivate labware

You can activate or deactivate labware for use in your system. If you edit applications, only the active labware is displayed in the Worktable tab (see *Worktable tab - equip the worktable on p. 58)*. Deactivated labware will not be displayed and cannot be used in applications. You can reactivate deactivated labware at any time.

Before you deactivate labware, make sure that it is not used in any applications. Applications using labware which is not active will not run in your system.

To activate or deactivate labware for use in your system, proceed as follows.

1. Open the labware file window (see *Access to the file window on p. 42)*.



2. Select a labware folder on the left-hand side of the Folder list.
   If there are subfolders, these are displayed in the Subfolder list.
3. If required, select a subfolder.
   The labware in this folder is displayed in the Labware list.

   A checked checkbox next to the labware indicates that this labware is active and can be used in applications.
4. To view additional information on a labware item, select the required labware and click on Info in the Labware Properties section.
5. Activate or deactivate the labware items as required by clicking the checkboxes.
6. Close the Labware file window.
   The labware you marked as active will be available for use in applications.

   You can change these settings again at any time.

5.7.3 Adjusting the labware bottom tolerance

Bottom tolerance can be adjusted only for some labware types, such as plates, tubes and tubs. You can identify editable labware in the file window easily by clicking on it: if the **Edit Labware** icon is active, you can edit the bottom tolerance for this labware.

Bottom tolerance describes the distance between the calculated bottom of the tube and the calculated lowest part of the pipette tip. The default setting for bottom tolerance for the majority of tubes is 1 mm. For some reservoirs, it is 2.5 mm.

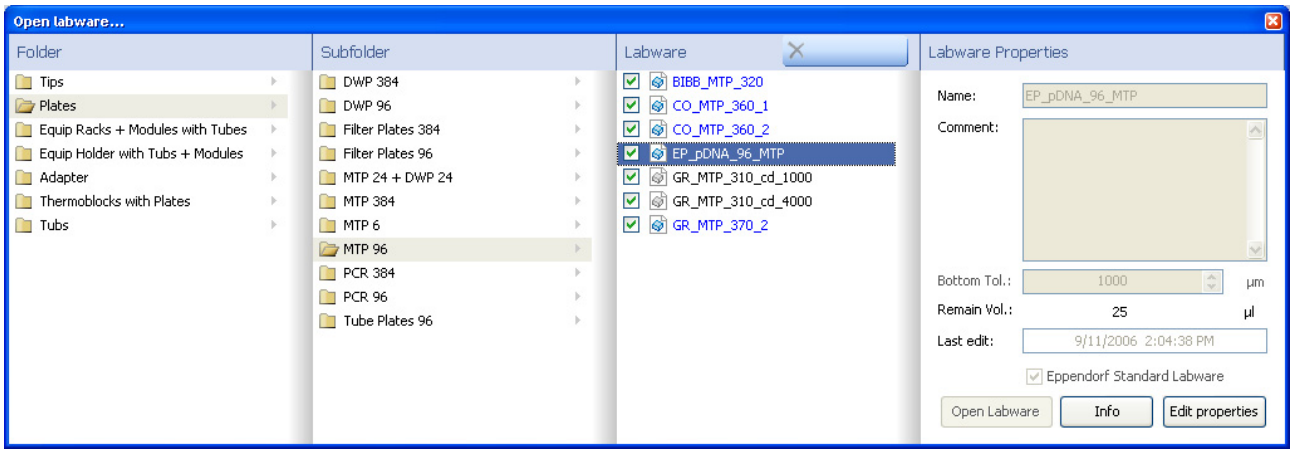
A reduction in bottom tolerance leads to a lower remaining volume and should only be used with expensive reagents. Reduced bottom tolerance should be examined again when changing batch of pipette tips, plates or tubes or if there is doubt about dispensing being correct.

In the case of special tasks, for example removing liquids from above a pellet, it is recommended that the factory-set bottom tolerance should be increased. The user has sole responsibility for the correctness of dispensing and for straightforward aspiration in the case of tubes with altered bottom tolerance.

Adjusting the bottom tolerance for labware is at your own risk.

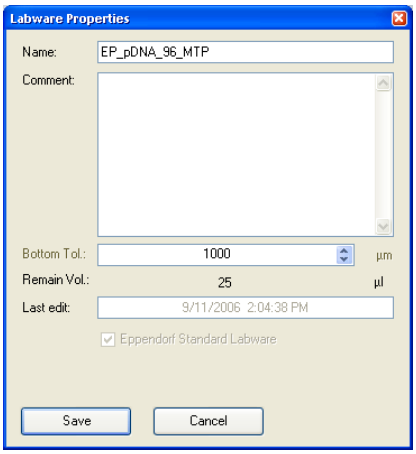
To adjust bottom tolerance for labware, proceed as follows.

1. Open the labware file window (see *Access to the file window on p. 42*).



2. Select a labware folder on the left-hand side of the **Folder** list.
   If there are subfolders, these are displayed in the **Subfolder** list.
3. If required, select a subfolder.
   The labware in this folder is displayed in the **Labware** list.
4. In the **Labware** list select the labware for which you want to modify the bottom tolerance.
   The properties of the selected labware are displayed on the right-hand side.
5. To edit the selected labware, click on **Edit properties**.

A dialog window appears.



6. Enter the required value in the **Bottom Tol.** field.

   The remaining volume is displayed below. The minimum bottom tolerance is 200 µm.

7. Click on **Save** to save the new setting.

   The new settings are saved. If the original labware file is read-only (Eppendorf Standard Labware), a copy of the original labware file is created automatically and is saved with the new settings. Copies are numbered consecutively.

   A reduced bottom tolerance should be approved for use only following the appropriate test runs. With the 30 mL and 100 mL reservoirs in particular, the reservoir must not be lifted by the pipette tips during aspiration as a result of a reduction in bottom tolerance.

   When calculating the Remaining Volume, the minimum immersion depth of 0.7 mm for the pipette tip in the liquid is included in addition to bottom tolerance. With the 30 mL and 100 mL reservoirs, volume information is not absolutely accurate in the case of reduced bottom tolerance (because of the serrated bottom).

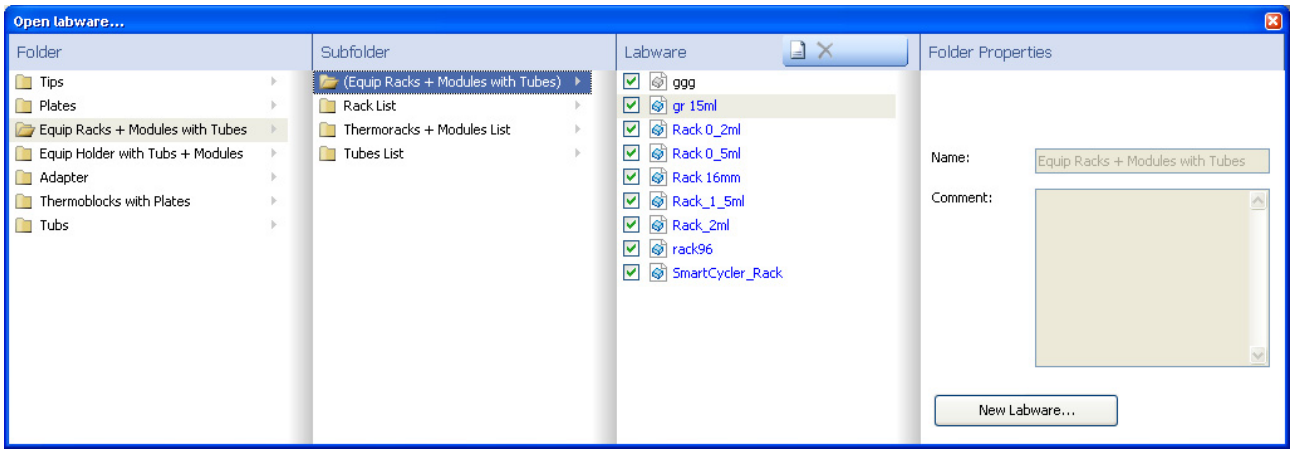
   In the case of less stable plates it should be noted that the plate could be slightly bent. It is therefore not recommended to reduce bottom tolerance with such plates.

5.7.4 Filling racks and module racks with tubes

You can create your own labware combinations from existing components, e.g., new rack-and-tube or module-rack-and-tube combinations. The module racks you equip here can then be combined with various reservoirs to create your own customized reservoir racks (see *Fill reservoir rack with reservoirs and filled module racks on p. 97*).

To equip a rack or module rack with tubes, proceed as follows.

1. Open the labware file window (see *Access to the file window on p. 42*).



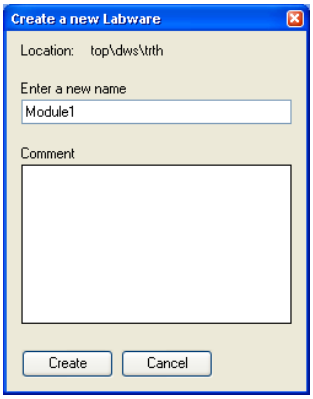
2. In the left-hand side of the Folder list and in the Subfolder list select the folder **Equip Racks + Modules with Tubes**.

   The existing labware combinations in this folder are displayed in the Labware list.

   The properties of the selected folder are displayed on the right-hand side.

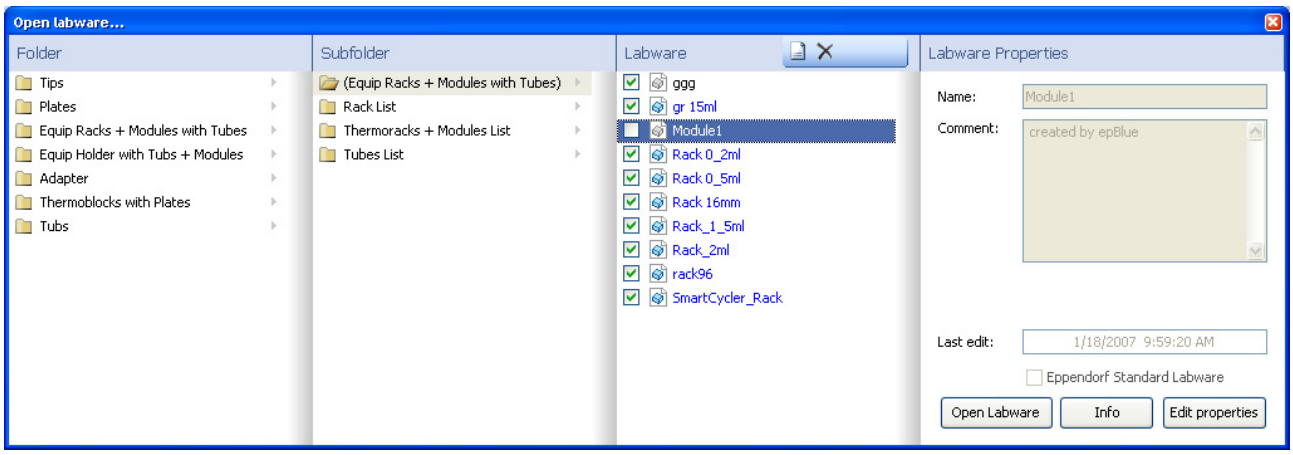
3. To create a new labware combination, e.g., to equip a module rack with tubes, click on New Labware.

   A dialog window opens.



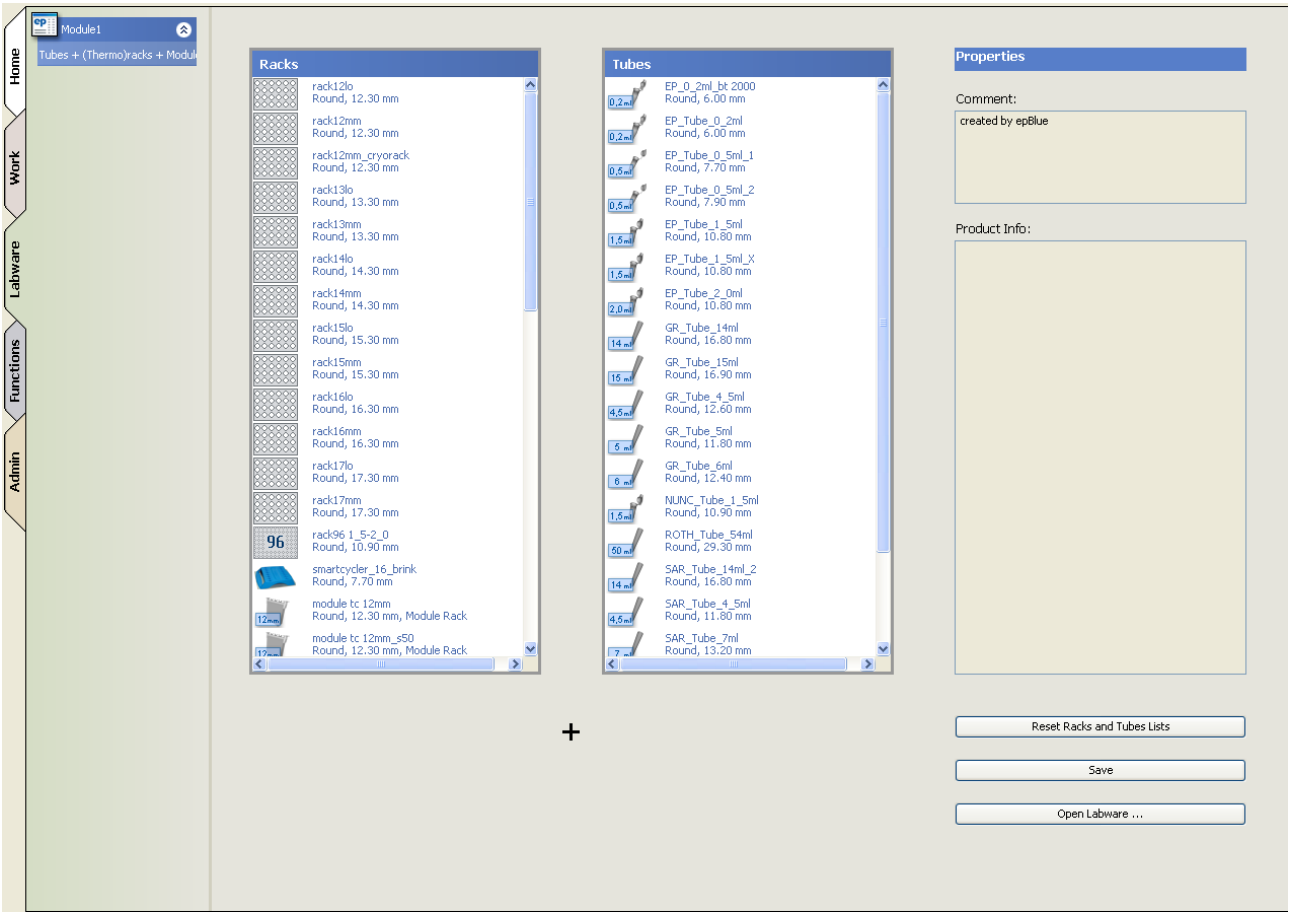
4. Enter a name for the new labware. If required, enter a short description of the combination in the Comment field.<Emphasis/>
5. Click on Create.

   The new labware combination has been created and is displayed in the Labware list.



The new labware is opened and displayed in the Labware tab.

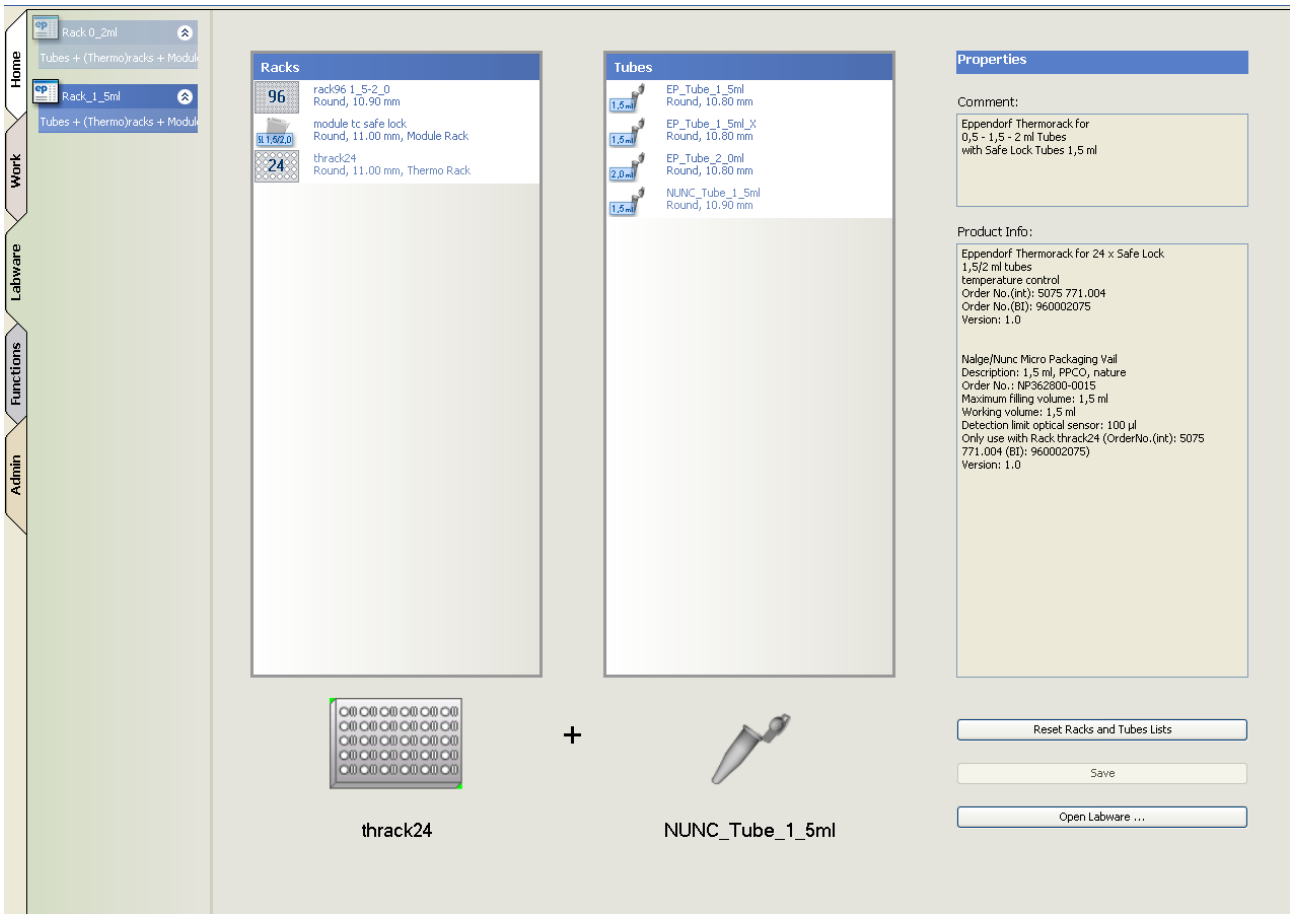
The **Racks** list on the left-hand side displays the available racks and module racks. The **Tubes** list in the center displays the available tubes with which you can equip the racks and module racks.



6. In the **Racks** list select a rack or module rack. In the **Tubes** list select the appropriate tubes.

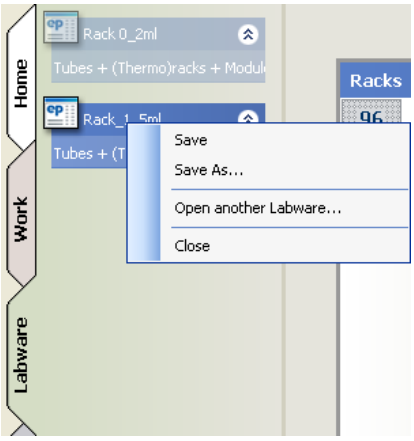
   If you make a selection in the **Racks** or **Tubes** lists, the lists are filtered so that only the components are displayed which can be used in combination with the selected object.

The selected items are displayed as graphics below the list. The **Product Info** field on the right shows additional information on the selected labware.



7. To reset both lists and make a new selection, click on **Reset Racks and Tubes Lists** on the right-hand side.
8. When you have selected a rack or module rack and the suitable tubes, click on **Save**.

   The labware combination is saved.
9. To save the combination under a different name, right-click on the labware in the list on the left-hand side of the **Labware** tab and select **Save As** from the context menu.



A dialog opens.

10. Enter a new name for the labware combination and click on **Save**.

    The labware is saved under a new name and displayed in the **Labware** tab for subsequent editing.

11. Create and edit other required labware combinations in the same way.

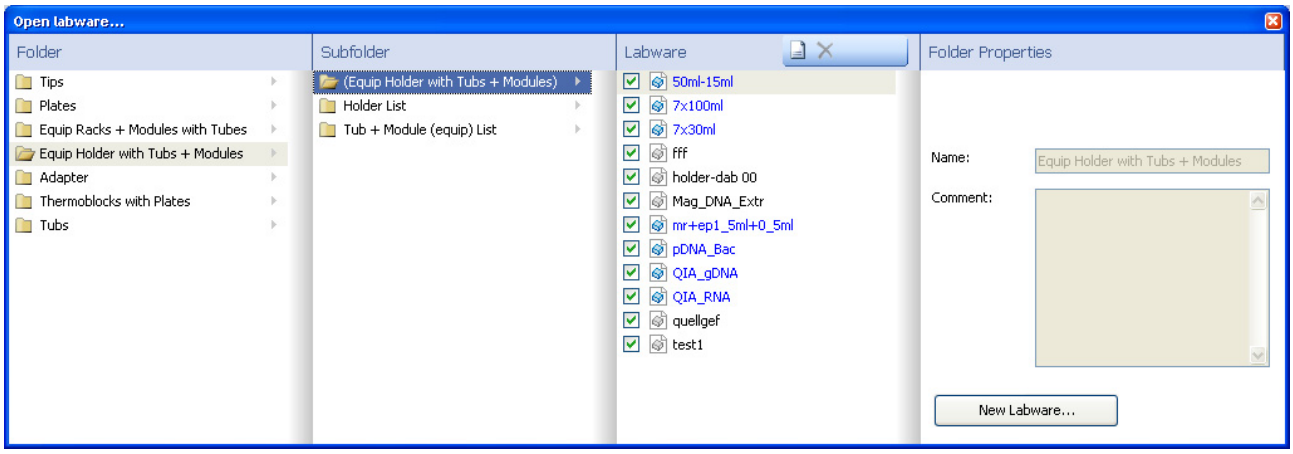
    The module racks you have equipped here can now be used to create your own customized reservoir racks (see p. 97).

5.7.5 Fill reservoir rack with reservoirs and filled module racks

You can create your own customized reservoir racks by equipping a rack or holder with various reservoirs or equipped module racks. If you have previously defined your own module-rack-and-tube combinations (see *Filling racks and module racks with tubes on p. 93*), you can now use those equipped module racks in a reservoir rack.

To equip a reservoir rack with reservoirs or equipped module racks, proceed as follows.

1. Open the labware file window (see *Access to the file window on p. 42*).



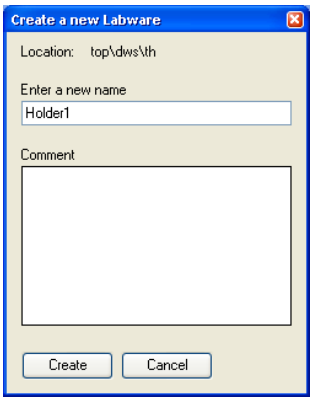
2. In the left-hand side of the **Folder** list and in the **Subfolder** list select the folder **Equip Holder with Tubes + Modules**.

   The existing labware combinations in this folder are displayed in the **Labware** list.

   The properties of the selected folder are displayed on the right-hand side.

3. To create a new labware combination, e.g., a new holder or reservoir rack, click on **New Labware**.

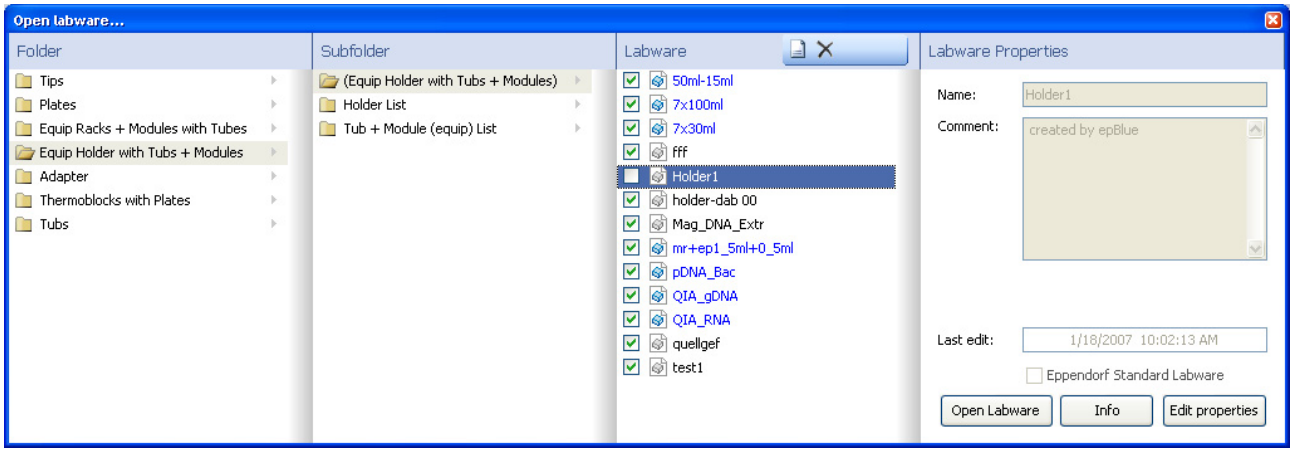
   A dialog window opens.



4. Enter a name for the new labware. If required, enter a short description of the combination in the Comment field.

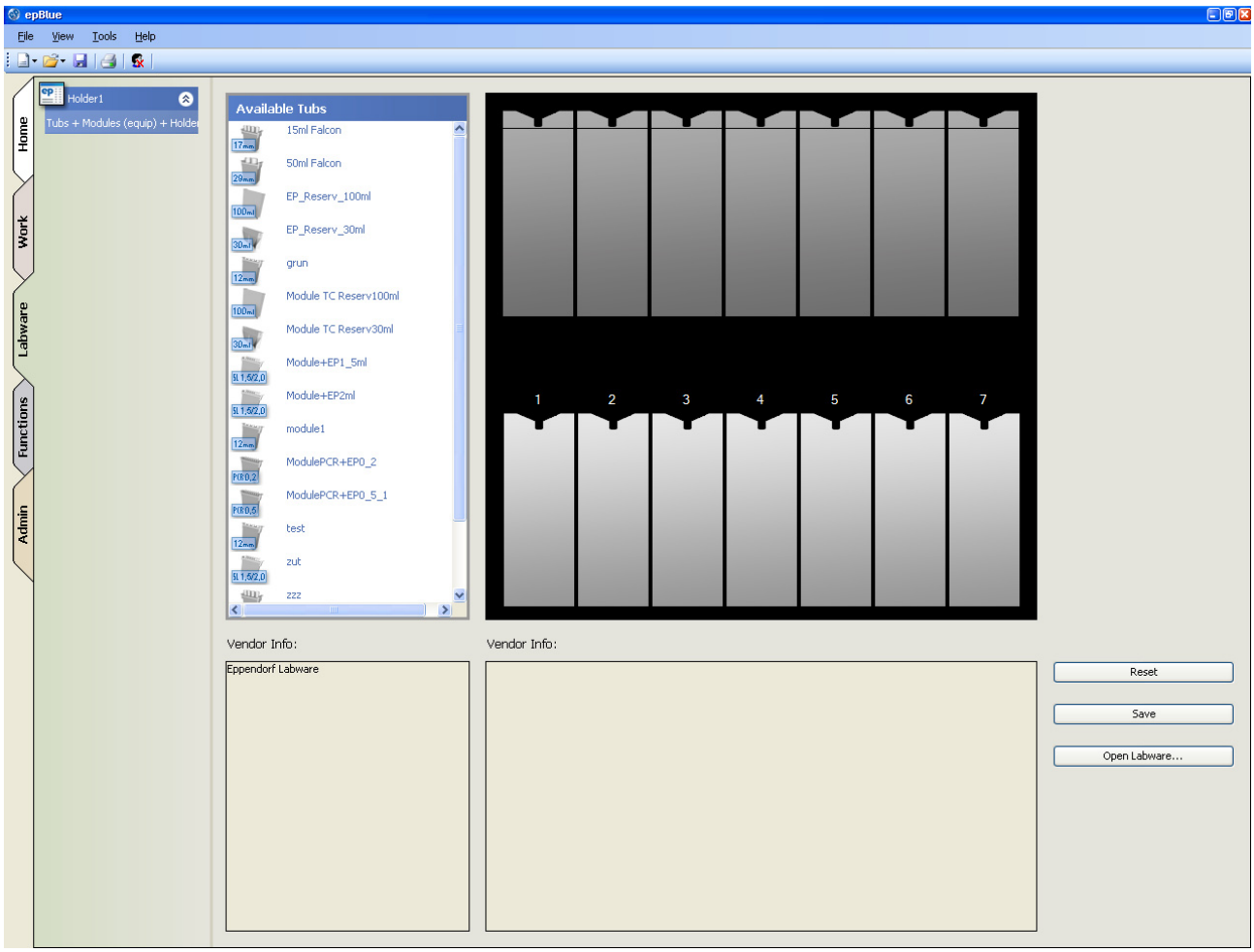
5. Click on **Create**.

   The new labware combination has been created and is displayed in the **Labware** list.



The new labware is opened and displayed in the **Labware** tab.

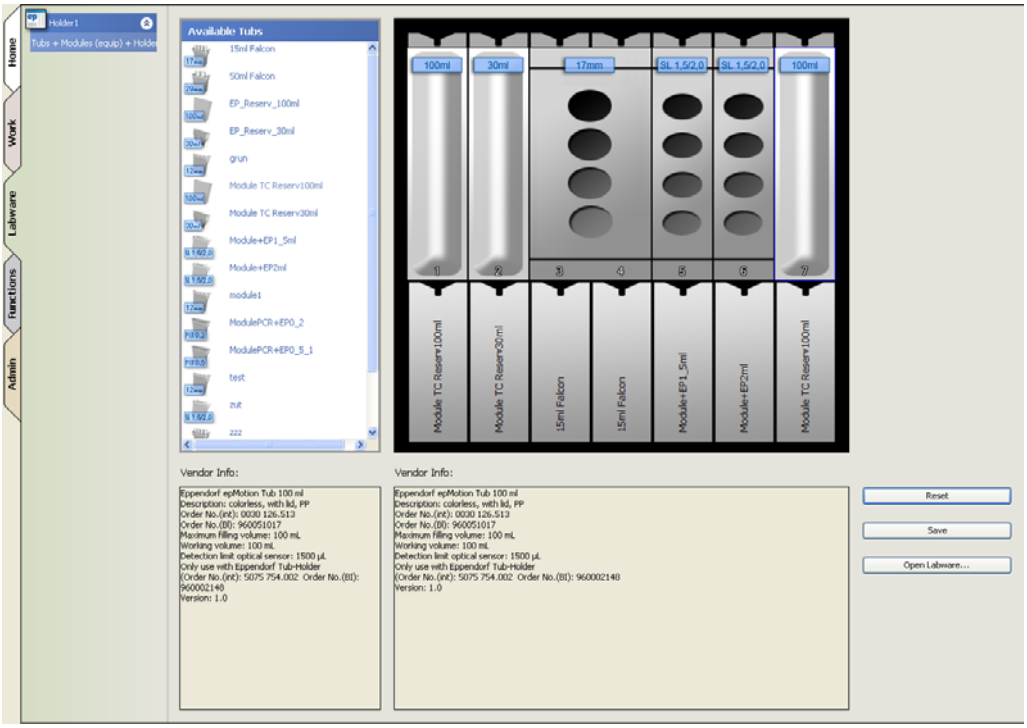
The list on the left shows the available reservoirs and the equipped module racks which you can use to equip the reservoir rack.



While you are dragging the reservoir or equipped module rack, it is attached to the mouse pointer by its upper left-hand corner. To position it in the reservoir rack, direct the mouse pointer (not the center of the reservoir or module rack icon) to the intended location.

6. Select a reservoir or equipped module rack from the list, drag it with the mouse to its intended location in the reservoir rack and drop it there by releasing the mouse button.

   The reservoir or equipped module rack is displayed in the reservoir rack.

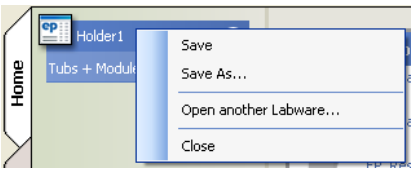


   The fields in the lower part of the **Labware** tab show additional information on the labware selected above.

7. To replace an item in the reservoir rack with a different reservoir or equipped module rack, simply drag the new item to the intended location. The old item is removed automatically.
8. When you have equipped the reservoir rack, click on **Save**.

   The combination is saved.

9. To save the combination under a different name, right-click on the labware in the list on the left-hand side of the **Labware** tab and select **Save As** from the context menu.



10. Enter a new name for the labware combination and click on **Save**.

    The labware is saved under a new name and displayed in the **Labware** tab for subsequent editing.

11. Create and edit other required reservoir racks and module racks in the same way.

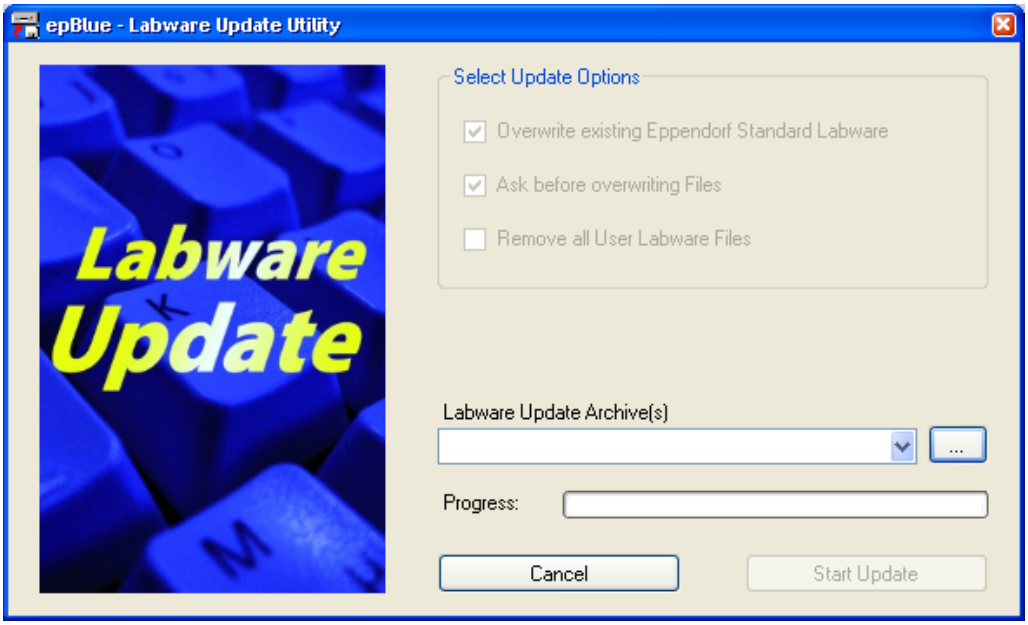
5.7.6 Download additional labware

In addition to the labware delivered with the system, more than 350 labware definitions are available for download in the VIP section at www.epMotion.com. To log in to the VIP section, a valid registration is required.

To download additional labware, proceed as follows.

1. Log in to the VIP section at www.epMotion.com.
2. In the Labware section, use the search criteria to find suitable labware. To add the labware to the selection, click on Add.
3. Download the labware files in your selection. For each labware definition, you will receive a zip-compressed file. Save these files in a temporary directory on your hard disk or on a USB storage device.
4. To import the labware definitions into epBlue, log in to epBlue as an administrator.
5. Select Tools - Labware Update from the main menu.

   The labware update window opens.



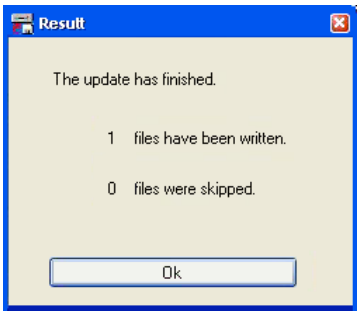
6. Under Labware Update Archive(s), select the downloaded zip files from your hard disk or USB storage device.
7. Activate or deactivate the update options as required.

   The following options are available:

   - Overwrite existing Eppendorf Standard Labware: activate this option to overwrite Eppendorf Standard Labware during update; deactivate this option to leave Eppendorf Standard Labware unchanged.
   - Ask before overwriting Files: activate this option to confirm before overwriting existing files; deactivate this option to overwrite existing files without confirmation.
   - Remove all User Labware Files: activate this option to remove all labware files defined by the users in your system; deactivate this option to keep any labware files defined by users.

8. Click on Start Update.

The labware files are imported into epBlue, and a confirmation message appears.



After the labware update has finished, you can delete the downloaded zip files from your hard disk or USB storage device.

5.8 The Functions tab

5.8.1 Overview of the Functions tab

This tab is only displayed if you are logged in as a member of a user group with the necessary user rights.

The Functions tab contains some general functions for configuring the system.

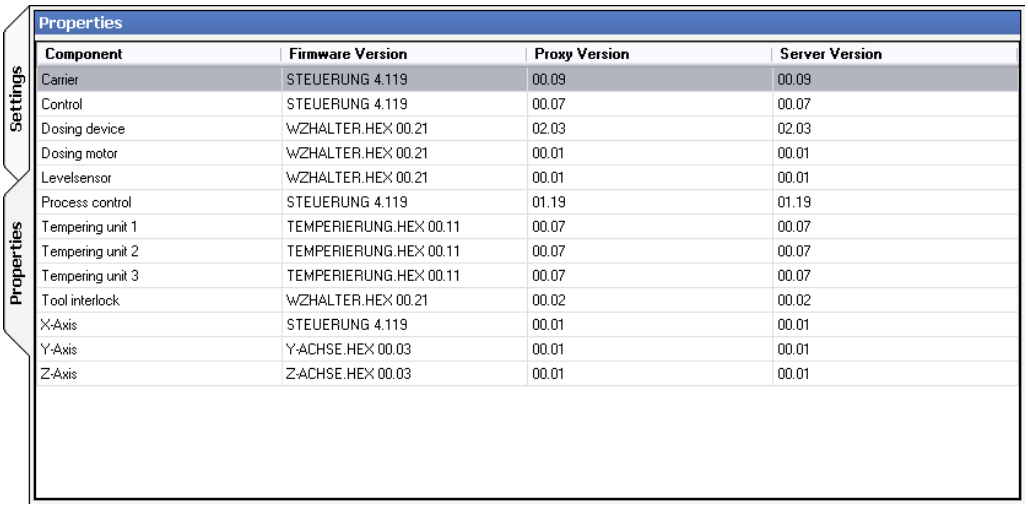
5.8.1.1 List of available devices

On the left-hand side of the Functions tab a list with all available devices is displayed. The current device is highlighted in darker blue. To switch between the devices, click on the device names in the list.

5.8.1.2 Two tabs for configuring devices

There are two further tabs within the Functions tab:

Properties: The Properties tab displays a component list and specifies its respective firmware, proxy and server versions.



Component	Firmware Version	Proxy Version	Server Version
Carrier	STEUERUNG 4.119	00.09	00.09
Control	STEUERUNG 4.119	00.07	00.07
Dosing device	WZHALTER.HEX 00.21	02.03	02.03
Dosing motor	WZHALTER.HEX 00.21	00.01	00.01
Levelsensor	WZHALTER.HEX 00.21	00.01	00.01
Process control	STEUERUNG 4.119	01.19	01.19
Tempering unit 1	TEMPERIERUNG.HEX 00.11	00.07	00.07
Tempering unit 2	TEMPERIERUNG.HEX 00.11	00.07	00.07
Tempering unit 3	TEMPERIERUNG.HEX 00.11	00.07	00.07
Tool interlock	WZHALTER.HEX 00.21	00.02	00.02
X-Axis	STEUERUNG 4.119	00.01	00.01
Y-Axis	Y-ACHSE.HEX 00.03	00.01	00.01
Z-Axis	Z-ACHSE.HEX 00.03	00.01	00.01

Settings: The Settings tab displays general information and you can execute service functions through it as described in the following sections.

5.8.2 Optical sensor

Use this function to set the general level sensor settings.

To do so, proceed as follows.

1. Select the function **Optical Sensor** in the **Settings** list.

   The current settings are displayed on the right.

   The following options are available:

   - **Levels**: check the liquid levels according to the settings defined for the individual labware items.
   - **Tips**: check the type and quantity of tips in the tip rack.
   - **Locations**: check that the labware is positioned correctly on the worktable, as specified in the method.

2. Activate or deactivate the options as required, and click on **Apply**.

   The new level sensor settings are active.

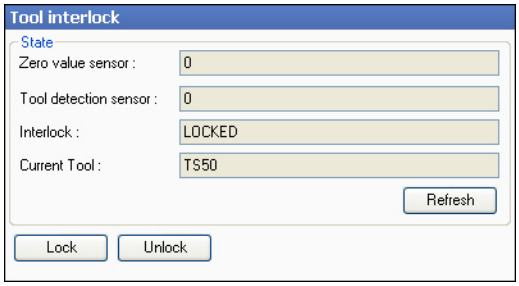
5.8.3 Tool interlock

To unlock the tool in case of a system error. This function allows you to control the locking mechanism of the carrier which locks the dispensing tool in position when it is taken up by the carrier.

To control the tool interlock, proceed as follows.

1. In the **Settings** list select the function **Tool interlock**.

   The current settings are displayed on the right.



The State section displays the current lock status.

- Zero value sensor: shows the status of the sensor which checks that the tool is in zero position.
- Tool detection sensor: shows the status of the sensor which identifies the tool in the carrier.
- Interlock: shows the current status of the tool interlock.
- Current Tool: if there is a tool in the carrier, it is identified and displayed here.

While you operate the locking mechanism, hold the tool firmly in position with one hand. Otherwise it will drop out of the locking mechanism and be damaged.

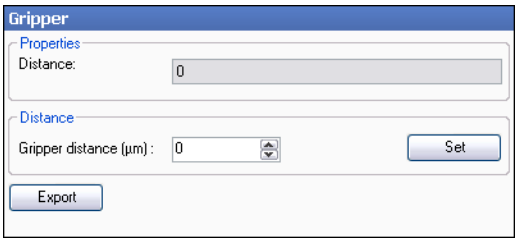
2. Click on Lock or Unlock to lock or unlock the tool.

5.8.4 Gripper

Use this function to check and adjust the distance of the gripper jaws.

To do so, proceed as follows.

1. In the Settings list select the function Gripper.
   The current settings are displayed on the right.



The Properties section displays the current distance of the gripper jaws.

The Distance section allows you to adjust the distance.

2. Enter the required distance in the Gripper distance field, and click on Set.
3. To export the settings to a file, click on Export.

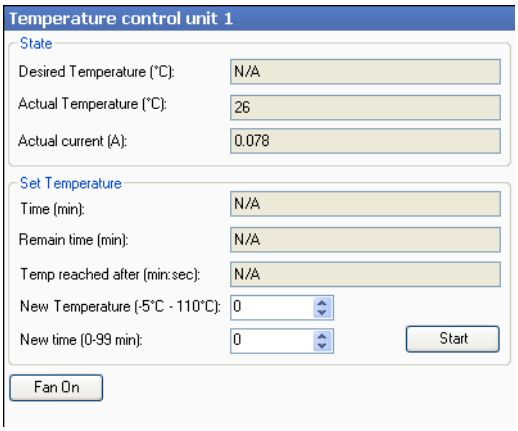
5.8.5 Thermal module x

Use this function to check the thermal modules in your system.

To do so, proceed as follows.

1. In the Settings list select the function Thermal module x for the thermal module you want to check.

The settings are displayed on the right.



The **State** section displays the current status.

- **Desired Temperature (°C)**: shows the target temperature.
- **Actual Temperature (°C)**: shows the current, measured temperature of the thermal module.
- **Actual current (A)**: shows the current flowing through the thermal module.

2. In the **New Temperature** field, enter a target temperature for the test (between -5°C and 110°C).
3. In the **New time** field, enter the duration of the test (between 0 and 99 minutes).
4. Click on **Start**.

   The thermal module starts heating or cooling, depending on the target setting and its actual temperature, until either the target temperature is reached or until the target time is up.

   In the **Set Temperature** section, the following information is displayed:

   - **Time (min)**: shows the time (in minutes) you specified as duration for the test.
   - **Remain time (min)**: shows the remaining time (in minutes) until the end of the test.
   - **Temp reached after (min:sec)**: shows the actual time needed to reach the target temperature.

   If the target temperature is reached before the target time is up, the thermal module holds the temperature for the remaining time until the end of the test.

5. To refresh the display during the test, click on **Refresh**.
6. To switch on the fan, click on **Fan On**.

5.8.6 Thermomixer

Use this function to check the Thermomixer in your system. To do so, proceed as follows.

WARNING!

Danger of injury from ejected labware when using the Thermomixer command

When employing too heavy labware and using too high speeds labware can come loose from the holder and be hurled around.

- Ensure that the front cover is closed and undamaged.
- Select low speeds with heavy labware.
- Only use compatible labware.

CAUTION!

Contusion through moving thermomixer

The thermomixer can cause light contusion during operation if touched.

- Ensure that the front cover is undamaged and is closed during operation.
- Do not reach into the epMotion during operation.

NOTICE!

Physical damage due to cross contamination and splashing liquid when using the Thermomixer command

With too high liquid level in the tubes and too high speeds liquids can splash out from the tubes which damage the device and can lead to cross contamination.

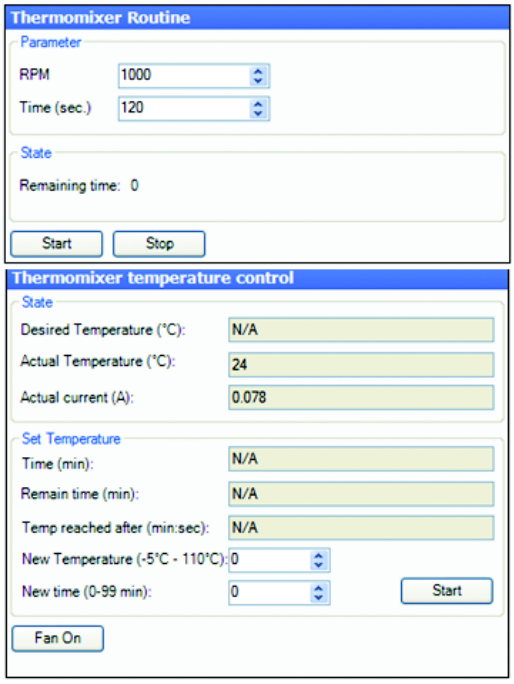
- Do not mix at high rotational speed with high liquid levels.

The use of the thermomixer via the **Service** command is your own responsibility. No warranty is accepted for damage caused by incorrect settings.

Tab. 1: Maximum revolutions per minute [rpm] when using the **Thermomixer** command

Labware Type	Maximum revolutions per minute [rpm]
Reservoir rack	-
Tubs	1000
Thermorack / Thermoblock	1000
DWP 384	1200
DWP 96	1200
MTP 384	2000
MTP 96	2000
PCR 384	2000
PCR 96	2000
MTP 6	1000
Thermoadapter 96	1000
Thermoadapter 384	1000

1. In the Settings list select the function Thermomixer.
   The settings are displayed on the right.



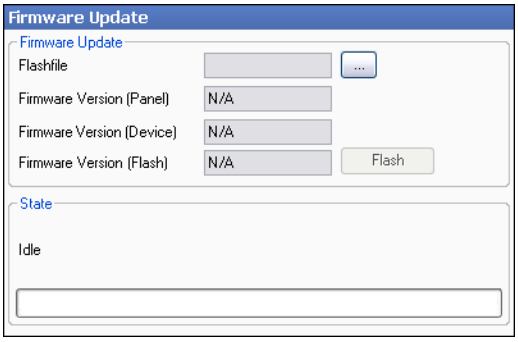
2. In the Parameter section of Mixer control enter a target speed (rpm) and the duration time of the mixing procedure.
3. Click on Start.
4. The State section of the Mixer control displays the remaining time of the mixing procedure.
5. Click on Stop to determine the mixing procedure.
   The Thermomixer mix until the duration time is up or until determine with Stop.
6. The State section of the Temperature control displays the current status.
   - Desired Temperature (°C): shows the target temperature.
   - Actual Temperature (°C): shows the actual, measured temperature of the thermomixer.
   - Actual current (A): shows the current flowing through the thermal module.
7. In the New Temperature field, enter a target temperature for the test (between 4°C and 95°C).
8. In the New time field, enter the duration of the test (between 0 and 99 minutes).
9. Click on Start.
   The Thermomixer starts heating or cooling, depending on the target setting an its actual temperature, until either the target temperature is reached or until the target time is up. In the Set Temperature section, the following information is displayed:
   - Time (min): shows the time (in minutes) you specified as duration for the test.
   - Remain time (min): shows the remaining time (in minutes) until the end of the test.
   - Temp reached after (min:sec): shows the actual time needed to reach the target temperature.

   If the target temperature is reached before the target time is up, the thermal module holds the temperature for the remaining time until the end of the test.
10. Click on Fan on to switch on the fan.

5.8.7 Firmware Update

With this function you can execute a **Firmware Update**.

1. In the Settings list select the function Firmware Update.



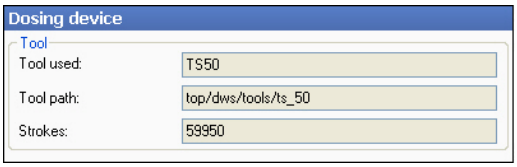
2. Under Flashfile, specify the location of the new firmware file.
3. Click on Flash.

   The firmware update is carried out. The progress is shown under State.
4. When the firmware update is complete, exit the client and the server software. Then restart first the server, then the client software.

5.8.8 Dosing device

Use this function to check the strokes of the dosing device for maintenance and calibration purposes.

Insert a tool and lock it with the Tool interlock function.



- Tool used: Name of the tool.
- Tool path: File path of the tool specification file.
- Strokes: Strokes of this dosing device.

Don't forget to remove the tool:

1. Hold the tool with one hand.
2. Unlock the tool carrier with the Tool interlock function.

5.9 The Admin tab

5.9.1 Logging in as administrator

NOTICE!

Loss of data due to misuse or loss of the administrator password.

The administrator password protects the system against unauthorized access to the configuration and the stored data of all users.

- Make a note of the administrator password and keep it in a safe place. If you lose the administrator password, contact Eppendorf Service.
- Provide the administrator password only to persons who are permitted to edit the configuration of the system and who have the necessary skills to do this.

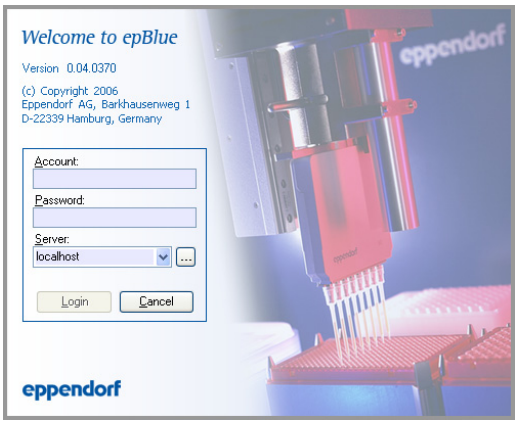
In order to prevent unauthorized access to the system, it is strongly recommended that you change the default administrator password as soon as possible (see *The Admin tab on p. 108)*.

It is recommended that you create individual user accounts for every operator who will use the epMotion 5075 (see *Creating the first user account on p. 33)*.

To log in as administrator, proceed as follows.

1. To start epBlue, double-click on the **Eppendorf epBlue** icon on the desktop, or select **Start - Programs - Eppendorf - epBlue** in the Windows Start menu.

   The login screen appears.



2. Enter the account name "administrator" and the administrator password (the default is "admin"), and click on Login.

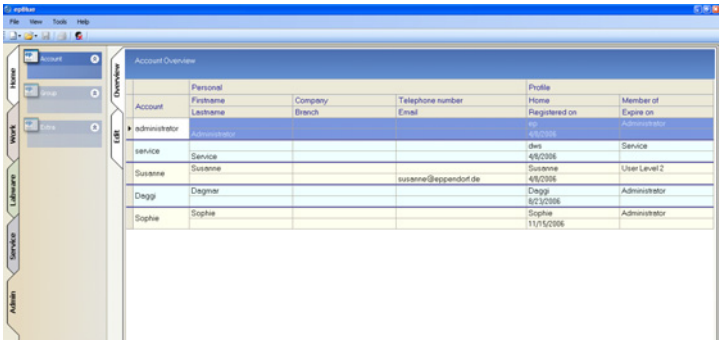
   epBlue starts and the program window displays the Home (see *Overview of the Home tab on p. 40)* tab. You are logged in as administrator.

3. Select the Admin tab on the left-hand side of the program window.

5.9.2 Overview of the Admin tab

The Admin tab is only displayed if you are logged in as administrator. It allows you, as administrator, to manage user accounts and groups.

In the left-hand column of the Admin tab you can change between **Account**, **Group** and **Extra**. The current selection is highlighted in darker blue.



5.9.2.1 Account

When Account is selected in the left-hand column of the Admin tab, there are two tabs for editing user accounts:

- Account Overview: shows a list of all user accounts and gives you some information about every user (see p. 112).
- Edit Account: allows you to create new user accounts or edit existing accounts (see p. 113).

5.9.2.2 Group

When Group is selected in the left-hand column of the Admin tab, there are two tabs for editing user groups:

- Group Overview: shows a list of all user groups and displays the user rights defined for every group (see p. 118).
- Edit Group: allows you to create new user groups and specify their user rights (see p. 119).

5.9.2.3 Extra

NOTICE!

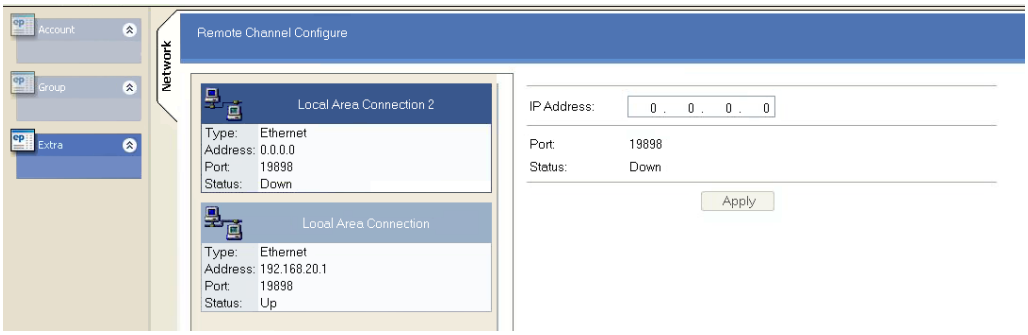
Malfunctions when connecting additional clients.

- Use only software approved and tested by Eppendorf AG.
- If you connect an additional client (e.g., PC or laptop) yourself and reconfigure the system, you take sole responsibility for this.
- Only install and configure an extra client if you have adequate experience of the relevant network and system configuration tasks.
- Integrate and configure an additional client into a cooperation network, only let an IT specialist do it who can also take over Support.
- Before installation, you should perform a data backup on the prospective client.
- Eppendorf AG expressly accepts no warranty for epBlue software functioning on the client together with other programs selected by the licensee.
- Eppendorf AG likewise accepts no liability for any damages or consequential damages (such as loss of profit, interrupted operations, loss of information or data) which may occur. This does not apply where compulsory liability is prescribed by law, in accordance with product liability law for example, in cases of intent, gross negligence, where there is loss of life, injury or impairment to health or if substantial contractual obligations are breached.
- Eppendorf AG does not give any support for any additional clients configured on the industry PC.

When Extra is selected in the left-hand column of the Admin tab, the Network and SMTP tabs are available:

Network - connect a second client

If you have selected Extra in the left-hand column of the Admin tab you can establish a point-to-point Ethernet connection to a second client. To this end, the client software (epBlue) is installed on the second computer with no server (see booklet). The client must be connected to the server computer (integrated industrial PC) by an Ethernet crossover cable. To enable the second client to have access to the server, the second network connection of the server PC must have an IP address assigned to it:



The network interface card of the second client needs the IP address of the server to get access:

1. Select the Network tab in the Extra tab of the Admin section of the server PC.
2. Select the field on the left, Local Area Connection 2.
3. Enter an IP address on the right.

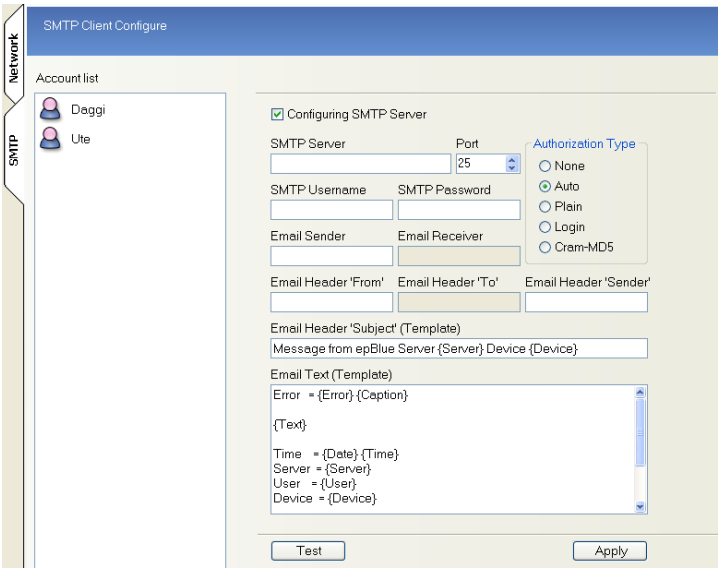
   The IP address should be 192.168.XXX.YYY. Do not use "20" or "020" for the numbers "XXX". This must not be the same as the IP address for the Local Area Connection or another IP address, which is already assigned to a device. The Local Area Connection is the connection to the device. By default, the server's IP address is 192.168.20.1, the device's IP address 192.168.20.2.
4. Adopt the IP address by clicking on Apply.

When the second client starts up, select the IP address quoted for the second network connection at Server in the login window. The second client now has access to the data of the server on the other computer.

SMTP

To carry out the SMTP settings you need to be familiar with network settings.

The SMTP form allows you to send messages, including error messages, via e-mail. If you activate the **Send** (see *Create new user account on p. 113)* checkbox in the Account settings, all messages will be sent to the specified e-mail address. This function can be individually set for each user. To be able to use this function, the outbox server (SMTP server) has to be defined in the SMTP form. It is not necessary to define an inbox.



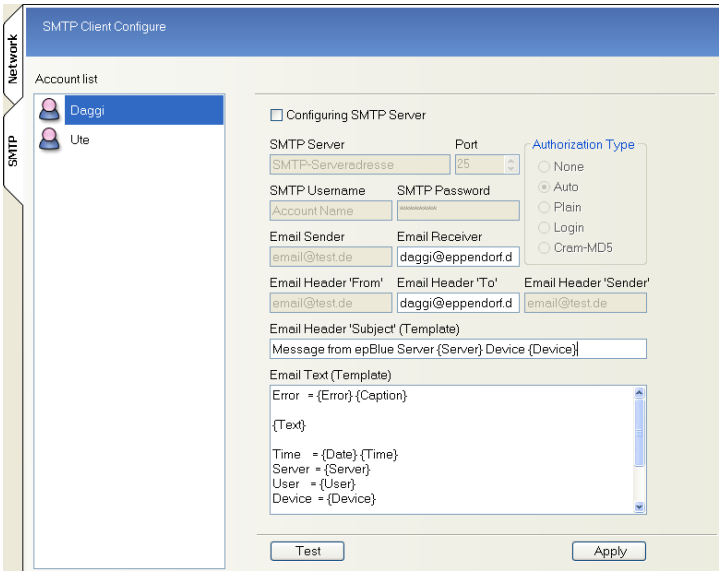
In the Account List on the left-hand side you will see all the accounts with the activated **Send** checkbox.

To carry out the SMTP server settings

1. Activate the **Configuring SMTP Server** checkbox.
2. Choose your Authorization Type.
3. Enter the address of your SMTP server.
4. Choose your **Port**,
5. Enter your SMTP account for the device or a user account (**SMTP Username**, **SMTP Password** and **Email Sender**), which will later be the sender account.
   - The **Email Header ´from´** and **Email Header ´Sender´** fields are automatically filled with the e-mail address of the **Email Sender**. You also have the option to change them.
   - The **Email Header ´Subject´** and **Email Text (Template)** fields are filled with template data. You also have the option to change them.
6. To confirm your settings, press **Apply**.
7. Deactivate the **Configuring SMTP Server** checkbox.

   Your SMTP settings are now active for all Accounts with the **Send** function.

8. Select a User Account from the Account List.



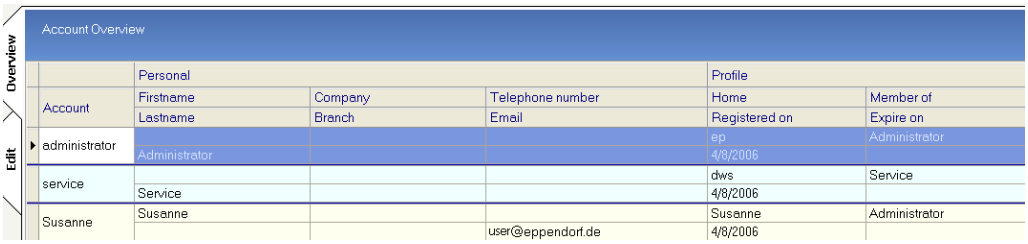
The e-mail address from the Account settings is shown as the **Email Receiver** and automatically inserted in the **Email Header `to`** field. You also have the option to change the e-mail address and the contents of the e-mail header independently of each other.

To confirm your settings, press **Apply**. Click on the **Test** button to check the data. A message appears. If the test failed, check the data and input the correct information.

If the transmission of a message has failed, a red envelop will appear on the right-hand side of the screen.

5.9.3 Account Overview

The **Account Overview** tab in the **Admin** tab provides an overview of all user accounts registered in your system.



The overview contains the following information.

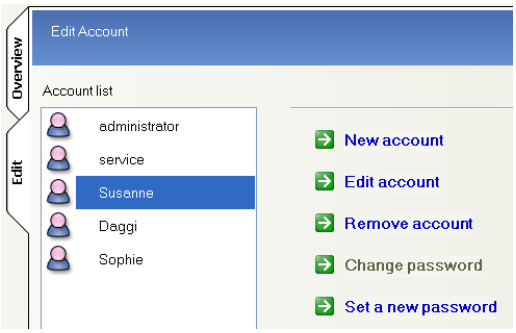
- **Personal Info**: the user's full name and contact information.
- **Profile Info**: the user's home directory, the date of registration of the user account and, if applicable, its expiry date.
- **Groups**: the user groups to which the user belongs. The user inherits the user rights defined for the selected group or groups.

To create or edit user accounts, go to the **Edit Account** tab.

5.9.4 Edit accounts

The Edit Account tab in the Admin tab provides functions for creating new or editing existing accounts. The Account List on the left-hand side displays the user accounts in your system.

You can create new user accounts (see p. 113), edit existing accounts (see p. 114), delete accounts (see p. 115), and change the password for an account (see p. 116).

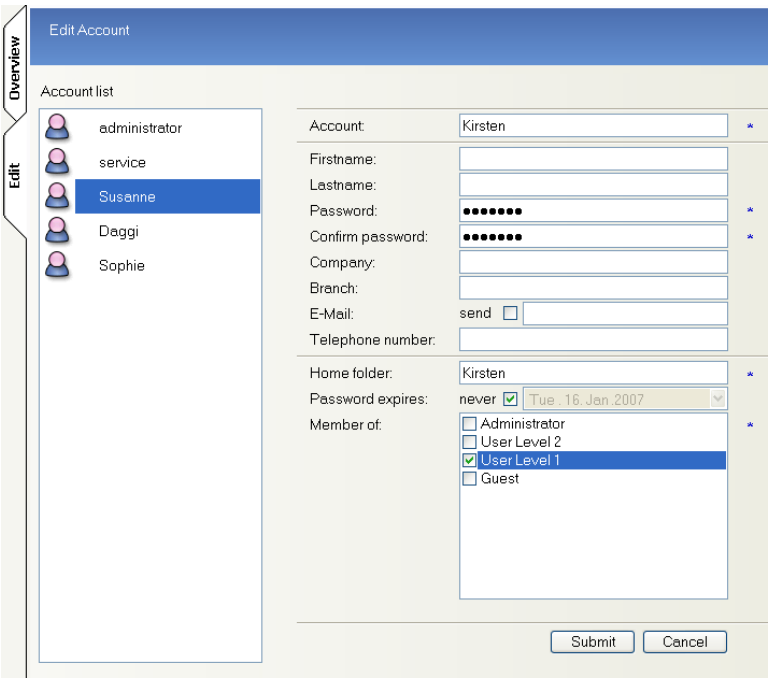


5.9.4.1 Create new user account

To create a new user account, proceed as follows.

1. Select **Account** in the left-hand area of the Admin tab to highlight it in dark blue and then select the Edit Account tab.
2. Click on New Account.

   The following form is displayed.



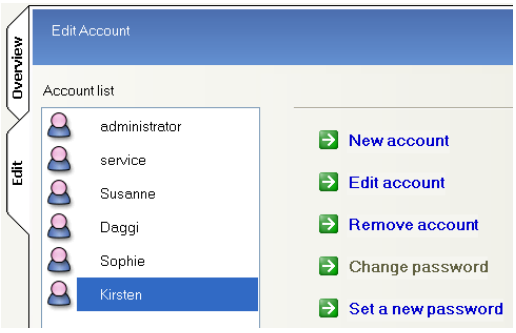
3. In the Account field, enter an account name for the new user.
4. In the Password and Confirm password fields, enter the password for the new user account. If the entries in the two fields do not match exactly, a message will be displayed. In this case, delete the contents of both fields and enter the password again.
5. In the Member of section, activate the user group to which you want the new user to belong. The user will have the user rights defined for the selected group.

6. If you want the user account to be active only until a certain date, deactivate the **never** option in the **Password expires** section, and set an expiry date.

   This will create a temporary account which automatically expires on the specified date. You can reactivate an expired account later by editing the account (see *Editing a user account on p. 114)*.

7. If you wish, you can enter further information about the new user, e.g., the user's name and contact information. This information is optional. If you enter the name of the user he or she will be addressed by this name in the **Home** tab after login. Otherwise the account name will appear.
8. If you want to send error messages via e-mail, activate the **Send** checkbox.
9. Click on **Submit**.

   The new user account is created. The user name appears in the Account List in the **Edit Account** tab.



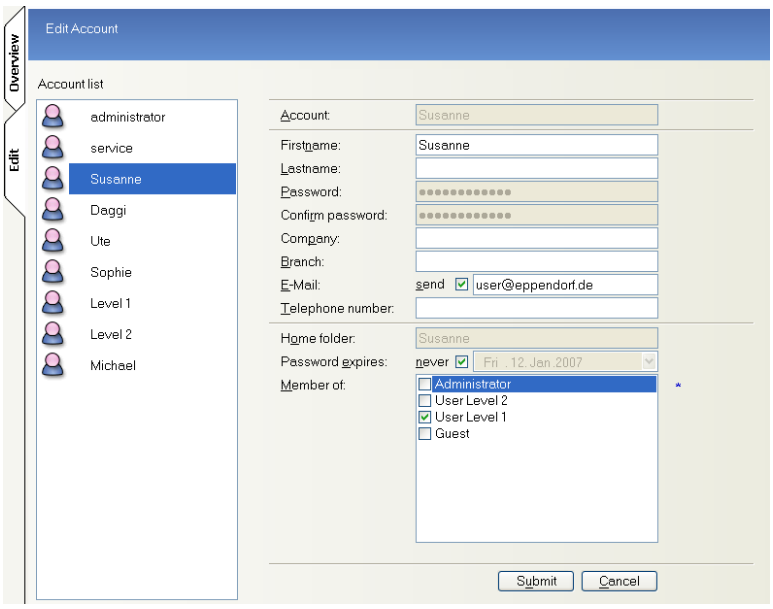
10. If required, create further user accounts in the same way.
11. When you have finished, log out as administrator to prevent unauthorized access to the system.

5.9.4.2 Editing a user account

To edit an existing user account, proceed as follows.

1. Select the **Edit Account** tab in the **Admin** tab.
2. In the Account List on the left-hand side, select the user you want to edit.
3. Click on **Edit Account**.

   The user account settings are displayed.



4. In the Member of section, activate the user group to which you want the user to belong. The user will have the user rights defined for the selected group.
5. If you want the user account to be active only until a certain date, deactivate the never option in the Password expires section, and set an expiry date.

   The account will automatically expire on the specified date. You can reactivate an expired account later by editing the account again.
6. If you wish, you can enter further information about the new user, e.g., the user's name and contact information. This information is optional. If you enter the name of the user he or she will be addressed by this name in the Home tab after login. Otherwise the account name will appear.
7. If you want to send error messages via e-mail, activate the Send checkbox.
8. Click on Submit.

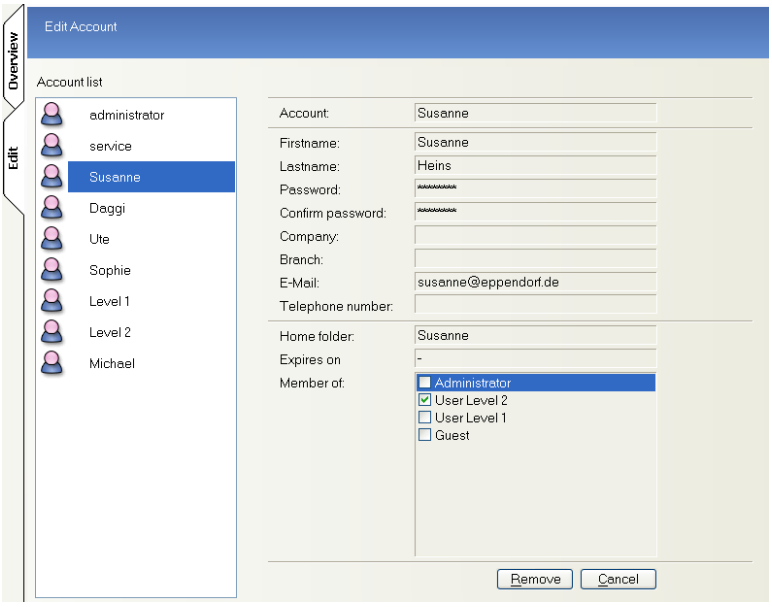
   The changed settings for this user account are now active.
9. If required, edit other user accounts in the same way.
10. When you have finished, log out as administrator to prevent unauthorized access to the system.

5.9.4.3 Deleting a user account

To delete a user account, proceed as follows.

1. Select the Edit Account tab in the Admin tab.
2. In the Account List on the left-hand side, select the user you want to delete.
3. Click on Remove Account.

   The user account settings are displayed.



4. Click on Remove.

   A message appears.
5. To keep the account, click on No.
6. To delete the account, click on Yes.

   The account is deleted.
7. When you have finished, log out as administrator to prevent unauthorized access to the system.

5.9.4.4 Change password

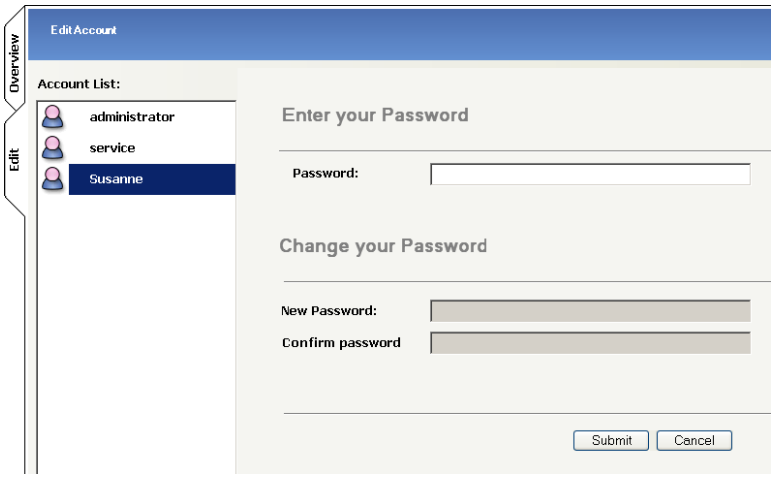
Every user can change his or her own password at any time by selecting Tools - Account - Change Password from the main menu.

If a user has lost his or her password, the administrator can change the user's password, e.g., reset it to a standard password. In this case, the user should then change the standard password to a personal password as soon as possible to prevent unauthorized access to the system.

To change the password for a user account, proceed as follows.

1. Select the Edit Account tab in the Admin tab.
2. In the Account List on the left-hand side, select the user whose password you want to change.
3. Click on Change Password.

   The following form is displayed.



4. In the **Password** field, enter the current password.
5. In the **New Password** and **Confirm password** fields, enter the new password. If the entries in the two fields do not match exactly, a message will be displayed. In this case, delete the contents of both fields and enter the new password again.
6. Click on Submit.

   The new password for this user account is now active.
7. When you have finished, log out as administrator to prevent unauthorized access to the system.

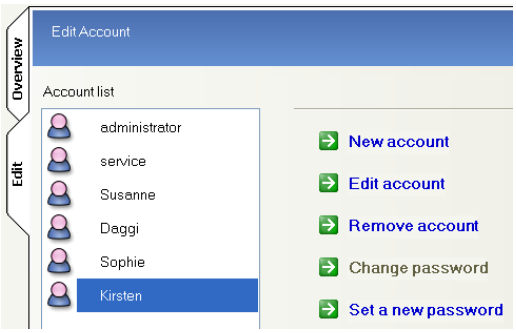
5.9.5 Set up a new password

If a user has lost the password, the administrator can change the user's password.

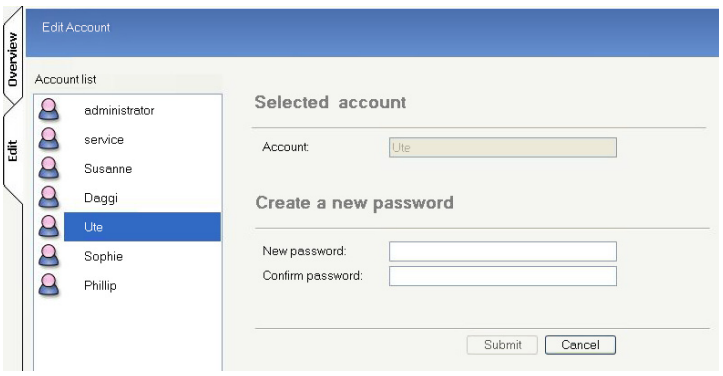
To set a new password for a user account, proceed as follows

1. In the Admin tab select the Account item and go to the Edit tab.

2. In the **Account List** select the user whose password has been forgotten on the left-hand side.



3. Click on **Set a new password**.
   The following form is displayed.



4. Enter the new password in the **New Password** and **Confirm Password** fields.
   If the entries in the fields do not match exactly, a message is displayed. In this case, delete the contents of both fields and enter the new password again.
5. Click on **Submit**.
   The new password for the selected user account is active.
6. Log out as administrator to prevent unauthorized access to the system.

5.9.6 Group overview

The Group Overview tab in the Admin tab displays a list of all user groups and the access rights defined for each group.

Overview

Group Overview

Group	Administrator	Administrator Lab	User Level 2	User Level 1	Guest
Fixed	☑	☑	☑	☑	☑
⊟ Application					
Create and edit application		X	X	X	
Simulate application		X	X	X	X
Start application		X	X	X	X
⊟ Barcode					
Barcode settings		X			
Remove barcode list		X			
⊟ Data					
Backup data	X				
Export data	X	X	X		
Import data	X	X	X		
Print data		X	X	X	
Restore data	X				
⊟ Labware					
Activate and deactivate labware		X	X		
Create and edit labware		X	X		
⊟ Services					
Applied services		X			
⊟ System					
Configurate system	X				
Manage account	X				
Setup hardware	X				
Setup software	X				

The overview contains the following information.

- **Group**: each group is displayed in a separate table column.
- **Fixed**: this checkbox is set for all groups because the user groups cannot be modified.
- **System, Application, Labware etc.**: the available user rights are listed. The rights that are active for a user group are marked with an X in the respective table cell.

The following user groups are available. For exact details of user groups and access rights in your system, please check the group overview for your system.

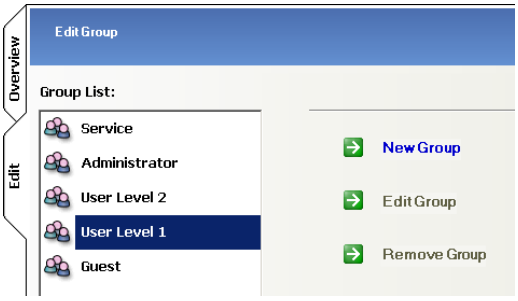
- **Service**: members of the Service group have access to all service functions. They are also authorized to configure the system, install hardware and software, save and restore data, manage accounts and labware, edit and run applications and print applications and logfiles.
- **Administrator**: members of the Administrator group can manage user accounts and user groups and have access to some service functions. They are authorized to configure the system, install hardware and software, save and restore data, manage labware, edit and run applications and print applications and logfiles.
- **User Level 2**: members of the User Level 2 group are able to edit and run applications, compile and modify labware which has been activated by an administrator or service employees, and print applications and logfiles. Additionally, they can access some service functions.
- **User Level 1**: members of the User Level 1 group are able to edit and run applications and print applications and logfiles.
- **Guest**: members of the Guest group are able to run applications and print applications and logfiles.

To create user groups, or to edit the user groups which you have created yourself, change to the Edit Group tab.

5.9.7 Creating and editing user groups

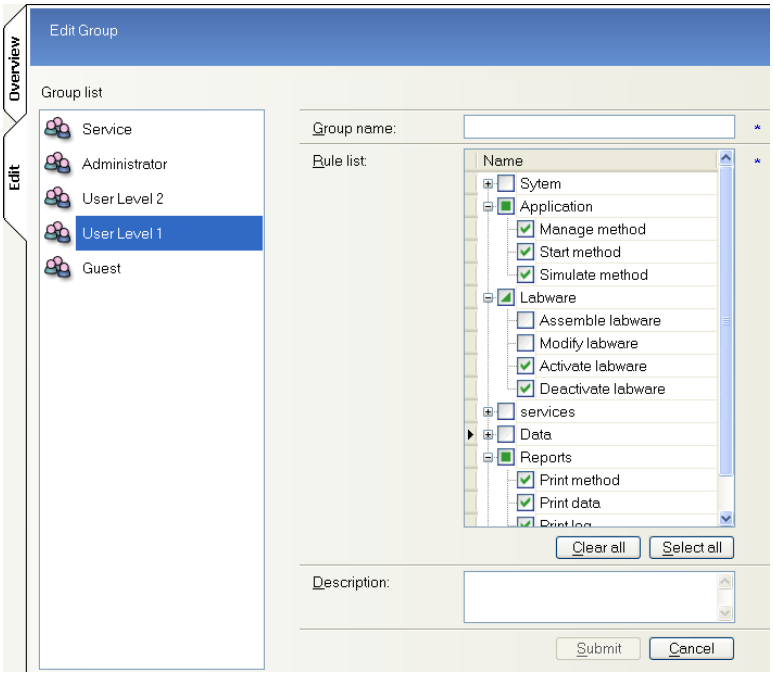
Using the Edit Group tab in the Admin tab you can create new user groups and define the access rights for all users within the group. The Group List on the left-hand side displays the user groups in your system.

You can edit only the user groups which you have created yourself. The Eppendorf standard user groups cannot be edited.



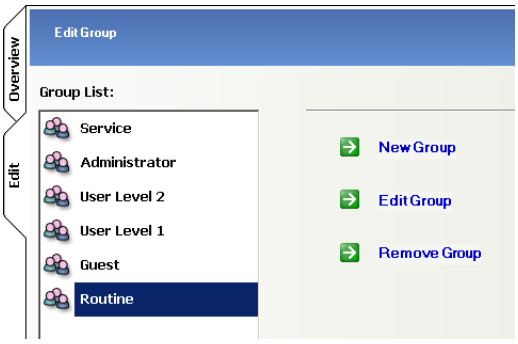
To create a new user group, proceed as follows.

1. In the left-hand area of the Admin tab select the Group entry so that it is highlighted in darker blue, and then select the Edit Group tab.
2. Click on New Group.
   The following form is displayed.



3. In the **Group Name** field, enter a name for the new group.
4. In the **Rule List** section, click on the plus symbols next to the categories (such as System, Application, Labware etc.) to display the user rights available in each category. Check the checkboxes to activate the required user rights for users of the new group.
5. If you wish, you can enter a short description of the user group in the **Description** section.
6. Click on Submit.

The new user group is created. The group appears in the Group List in the Edit Group tab.



To add users to the new group, you can either create new user accounts (see *Create new user account on p. 113)* or edit existing user accounts (see *Editing a user account on p. 114)*.

7. To **edit** the access rights for a group you have created, select it in the Group List in the Edit Group tab and click on Edit Group. The properties of the group are displayed. Activate or deactivate the user rights as required, and click on Submit. The changes are active immediately.
8. To **delete** a group you have created, select it in the Group List in the Edit Group tab and click on Remove Group. The properties of the group are displayed. Click on Remove, and confirm the warning message with Yes to delete the group.
9. When you have finished, log out as administrator to prevent unauthorized access to the system.

5.9.8 Starting data backup and restoring data

NOTICE!

Data loss due to lack of data backup or incorrect storage of data carriers.

epBlue saves all information on user accounts, applications, labware and logfiles in a database on the epMotion PC. Damage to this database (e.g., due to a hardware fault) causes this information to be lost.

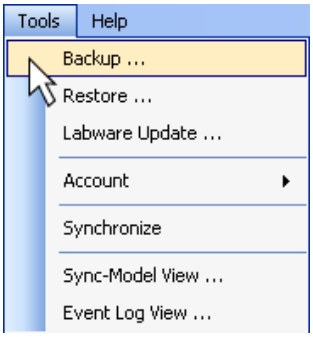
- Carry out regular database backups via the function Backup in Admin tab.
- Save the backup file on a secure data carrier and store it in accordance with the manufacturer instructions.

Eppendorf is not liable for data loss and its consequences.

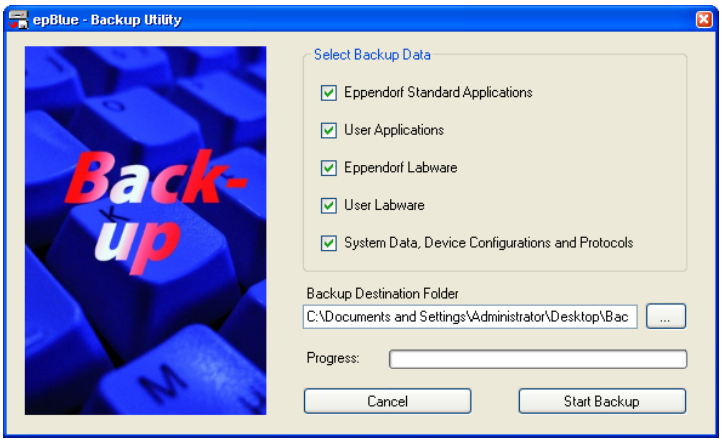
If you are logged in as Administrator or User Level 2, you can start data backup to save applications, labware definitions and system data in a zip compressed archive. It is recommended to carry out data backup on a regular basis. As Administrator, you can also restore data from a previous backup.

To start data backup, proceed as follows.

1. Select Tools - Backup from the menu.



The Backup window opens.



2. In the **Select Backup Data** section, activate the checkboxes to specify the data you want to save.

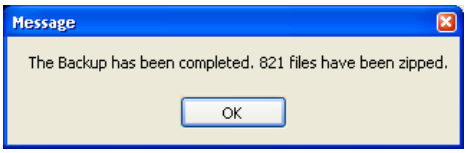
   The following options are available:

   - Eppendorf Standard Applications: save all default applications delivered and installed with the software.
   - User Applications: saves all applications created by yourself and other users working with your system. No user account data will be saved (see "System Data, Configurations and Protocols").
   - Eppendorf Labware: saves all default labware specification files delivered and installed with the software.
   - User Labware: saves all labware combinations created by yourself and other users working with your system.
   - System Data, Device Configurations, User Accounts and Protocols: saves important system data, information on the configuration of all devices connected to your system, and protocol files documenting your applications and program runs.

3. In the **Backup Destination Folder** field, enter the path and directory where you want the zip-compressed archive file to be saved, or click on the button on the right to select the directory.
4. Click on **Start Backup**.

   Backup of the selected data is carried out. The progress bar shows the current status of the backup process.

   When backup is finished, a message appears.



5. Click on **OK** to return to the Backup window, and click on **Cancel** to close the Backup window.

   The data backup has been completed.

Restoring data will not only restore Eppendorf standard data, but - depending on the options you select - may also overwrite the data created by users in your system, such as user applications or customized labware combinations.

Before you restore data from a previous backup, it is strongly recommended to backup all current user applications and labware, so that you can restore them if required.

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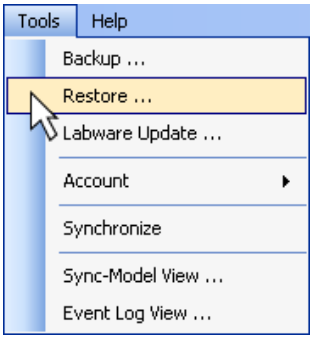
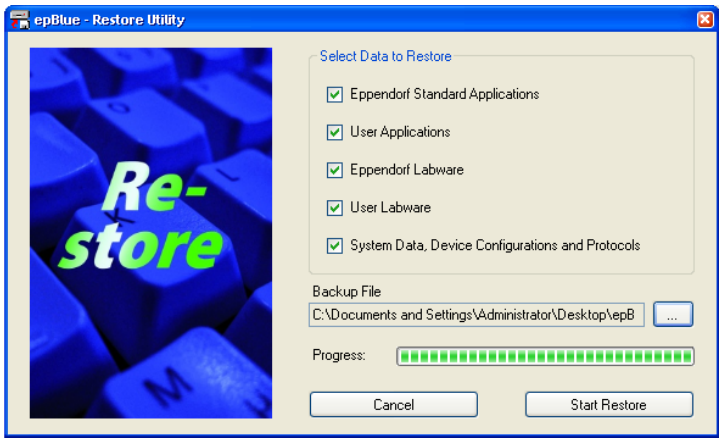
6. To restore data from a backup archive, select **Tools - Restore** from the menu.



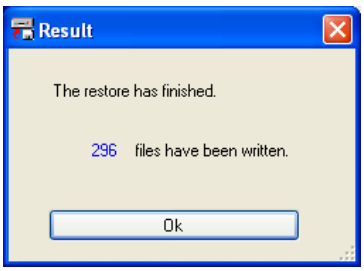
The Restore window opens.



7. In the **Select Data to Restore** section, activate the checkboxes to specify the data you want to restore from the archive.
8. In the **Backup File** field, enter the path and name of the zip-compressed archive that contains the data you want to restore, or click on the button on the right to select the file from its directory.
9. Click on **Start Restore**.

   The selected data is restored. The progress bar shows the current status of the restore process.

   When the process is finished, a message appears.



10. Click on **OK** to return to the Restore window, and click on **Cancel** to close the Restore window.

    The data has been restored.

After restoring the **System Data, Device Configurations and Protocols**, restart the epBlue server.

5.9.9 Printing the error log and debug log

As administrator you can print the error log and the debug log via the menu in the **Functions** tab. This can help you identify the cause of a problem.

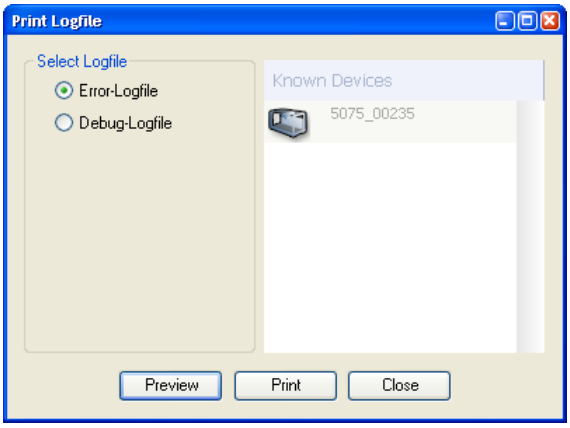
The debug log can only be recorded by the administrator and is required only if the Eppendorf Service team needs more information in the event of any faults occurring.

- The error log records all errors which occur during operation of the system.
- The debug log records detailed information on all software processes during a run, including errors. To be able to record debug information, make sure that you are logged in as administrator and place a tick in the **Run** tab in the **Debug Log** checkbox before starting a program sequence (see *The Run tab on p. 81)*.

To print the error log and the debug log, proceed as follows.

1. Go to the **Functions** tab and select **File - Print** from the menu or click on the **Print** icon in the toolbar.

   The print window opens.



2. Select the logfile you want to print, and select a device, if required.
3. To print the logfile on the standard printer configured in your system, click on **Print**.
4. To display the logfile in a separate window, click on **Preview**.

   The preview window is described in more detail in the "**Work** tab" (see *Printing applications and logfiles on p. 56)* section.
5. To close the print window, click on **Cancel**.

6 Quick start

6.1 Short instructions

Only trained staff already familiar with the operating manual and the epMotion may work to the short instructions. Observe the safety precautions.

6.1.1 Select and start the epMotion method

1. Double-click on the **Eppendorf epBlue** icon on the desktop, or select **Start - Programs - Eppendorf - epBlue** in the Windows Start menu.

   epBlue starts, and the login screen appears.
2. Enter your account name and your password.
3. Click on Login.

   epBlue starts and the program window displays the Home tab.
4. Click on Open / run applications in the Tasks area of the Home tab or click on the icon Open and select Open Application or select File - Open / run applications in the main menu.

   The file window opens.
5. Open the user directory and the folder containing the epMotion method you want to start. Select the method and click on Open Application.

   If the method is suitable for more than one device in your system, a list of devices is displayed.
6. Select the device you want to use and click on OK.

   The method opens and the program window changes to the Work tab.
7. In the Work tab select the Worktable tab and check the equipment of the worktable. Check whether the labware shown in the display is available at the corresponding locations in the worktable and whether all locations identified as empty in the display are actually empty.
8. Check whether the tip racks are sufficiently filled with tips, whether all tubes are open and whether the waste basket is empty.
9. Close the front hood.
10. Change to the Run tab and activate the option Filter Device List to display only devices that are online and suitable for the method.
11. Select the device you want to use and click on Run.

    The method is loaded on the selected device.

    If the number of samples for each step in the procedure has been defined as variable, a window opens.
12. Enter the number of samples and click on OK. If required, enter the number of samples for further commands in the same way.
13. To edit labware-specific configurations for the level sensor and the volumes, double click on the labware in the Worktable area of the Run tab or right click on the labware and select Properties in the context menu.
14. To define the level sensor configurations for this method run, activate or deactivate the corresponding options.

    The level sensor can execute the following scans.

    - Levels: check the liquid levels according to the settings defined for the individual labware items.
    - Tips: check the type and quantity of tips in the tip rack.
    - Locations: check that the labware is positioned correctly on the worktable, as specified in the method.

15. Click on Run.
16. If necessary enter the liquid levels for the labware objects for which the Liquid Detection has been deactivated and click on Run.

    The method starts and the display changes to the Control tab. The progress and current status of the method is displayed. A message appears when the method run is complete.
17. To cancel the method before it is complete click on the icon Stop in the Control tab. The method stops. Then click on the Abort icon to abort the method.

6.2 Example method for epMotion

6.2.1 Method objective

A suitable volume of a PCR Mastermix is to be dispensed into a PCR 96-well plate from a thermorack supplied with 1.5 mL Eppendorf micro test tubes. The DNA samples from an MTP 96-well plate are then pipetted into the relevant wells of the PCR 96 plate and the PCR mixture carefully mixed. In this example, the volume of the mixture is 20 µL.

6.2.2 Sample preparation

1. Prepare the Mastermix in a 1.5 mL Eppendorf micro test tube and position in the thermorack. In doing so, observe the calculations for aspiration volumes.
2. Transfer eight DNA samples with a volume of at least 50 µL to the MTP 96 plate in any sequence.

You can also perform a test run using distilled water.

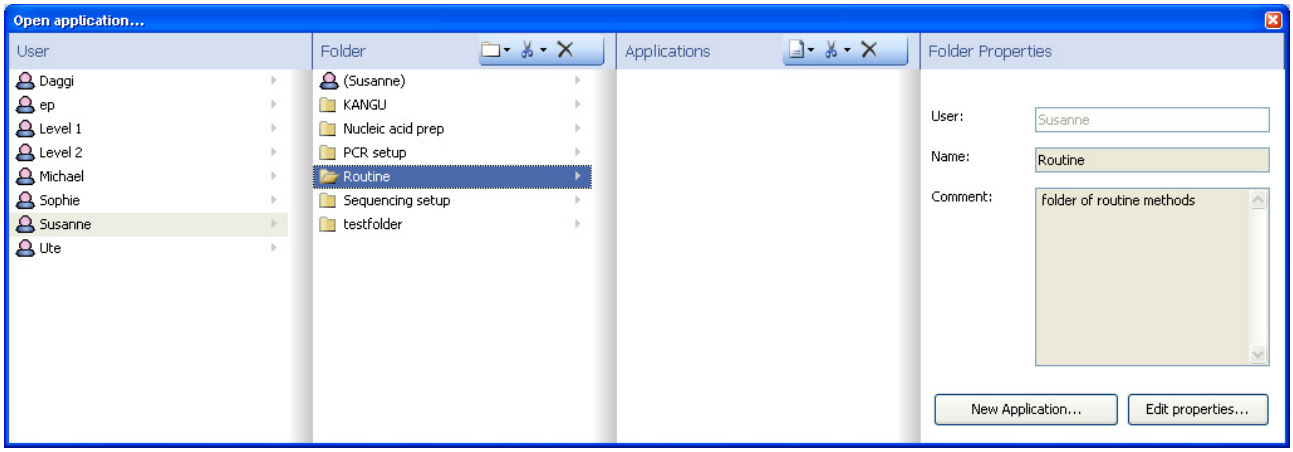
6.2.3 Create an example method

The following sections describe the steps for creating the example method specified above. To follow these instructions, you must be familiar with the operating manual and the epMotion. Follow the safety notes at all times. If you are unsure please refer to the extensive description in the Work tab (see *The Work tab on p. 53)*.

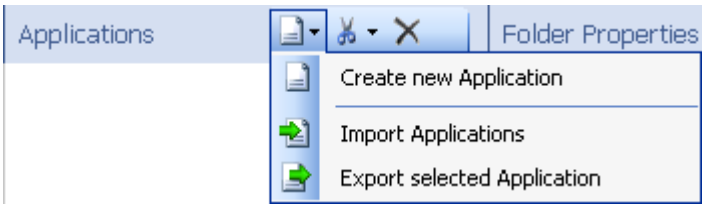
6.2.3.1 Logging in and creating a new method

1. Log in to your user account.
2. Click on Create / edit applications in the Tasks section of the Home tab or click on the New icon and select New Application or select File - Create / edit applications in the main menu.

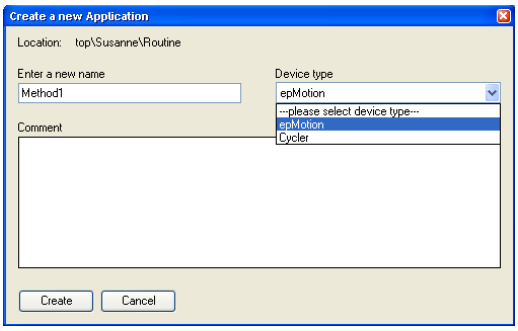
   The file window opens.



3. Select your user name in the User list on the left-hand side to gain access to your user directory.
4. In the Folder list select the folder in which you want to create the new method.
5. Click on New Application or right click in the Applications list and select New Application in the context menu or click on the Create new application icon above the Applications list.

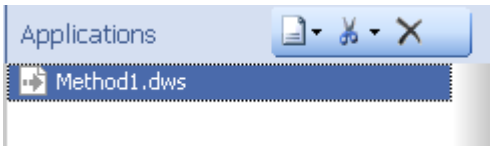


The following window opens.



6. Enter a name for the new method. If required, enter a short description of the method in the Comment field.
7. In the Device type list select the item Workstation.
8. Click on Create.

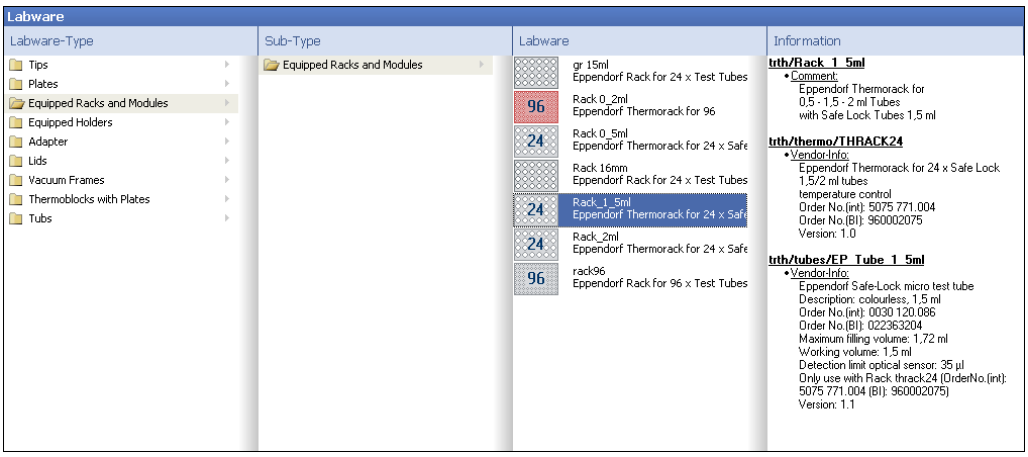
   The new method has been created and is displayed in the Applications list.



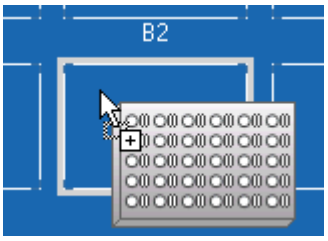
The method opens and the program window changes to the Work tab.

6.2.3.2 Supplying the worktable

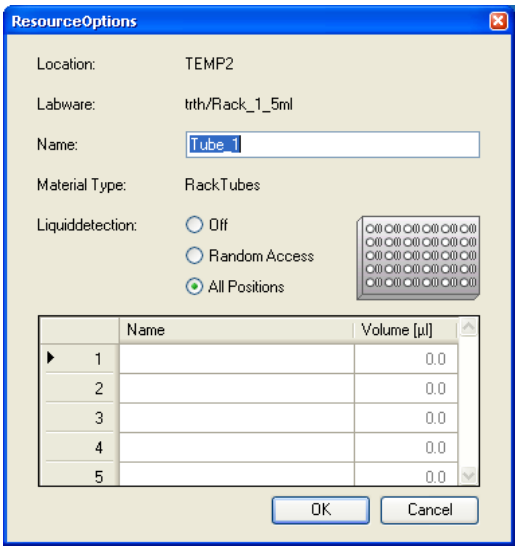
1. In the **Work** tab select the **Worktable** tab to equip the worktable with the labware required for your method.
2. In the **Labware Type** and **Sub-Type** lists select the **Equipped Racks + Modules** item. In the **Labware** list select the thermorack **Rack_1_5ml**.



3. Right-click and drag the Rack upwards with the mouse, then drop it in location C2 (TEMP2).

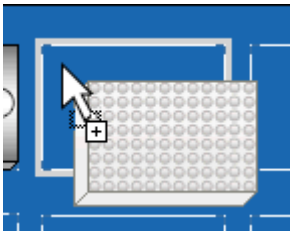


A dialog window opens, displaying information about the rack which has been positioned.

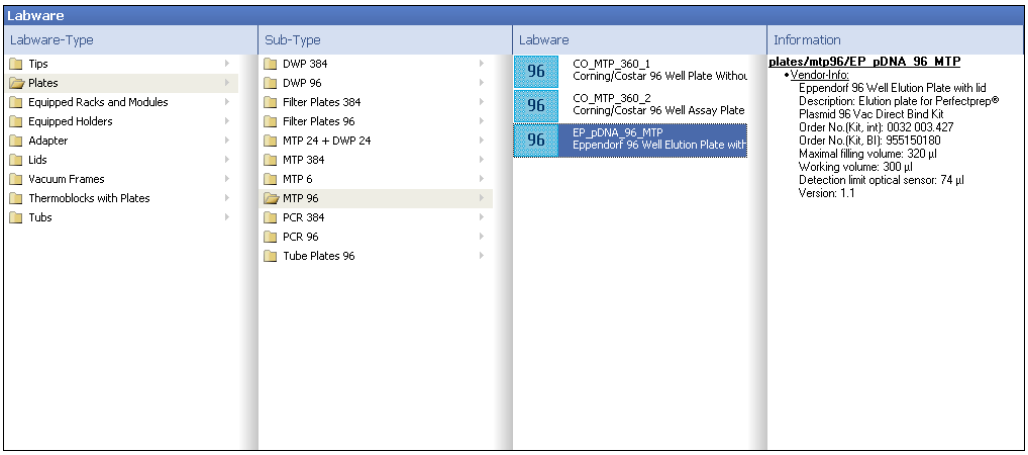


4. Check that for **Liquiddetection** by the optical sensor **All Positions** has been selected and click on **OK**.

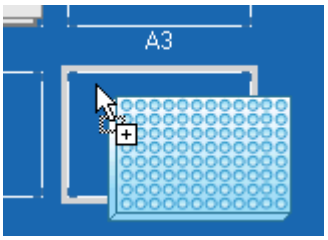
5. In the Labware list under Tips, select 50 µL tips (tip50) and position them in location A2.



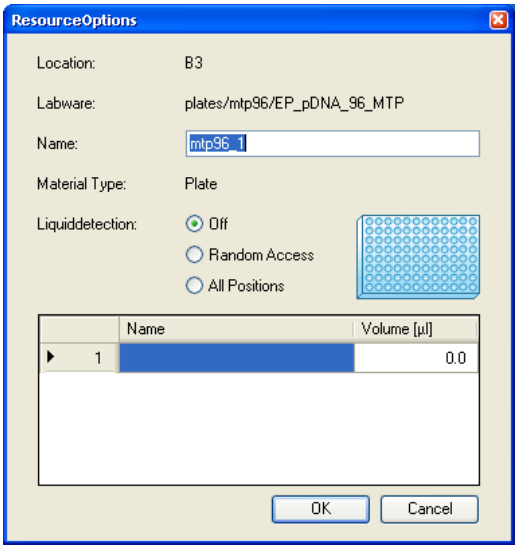
6. Click on OK to close the dialog window.
7. Under Plates and then under mtp96, select the MTP 96 plate (EP_pDNA_MTP_96).



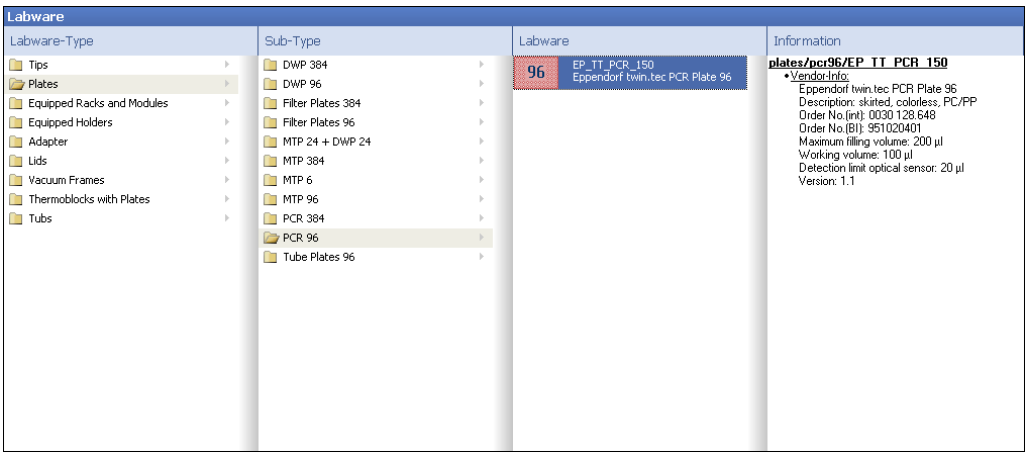
8. Position the plate in location B3.



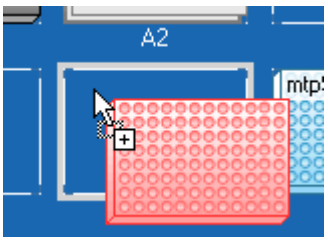
9. In the dialog window, check whether liquid detection is set to Off, and click on OK. Liquid detection is very time-consuming for plates with 96 wells.



10. Under Plates and PCR 96, select PCR plate EP_TT_PCR_150.

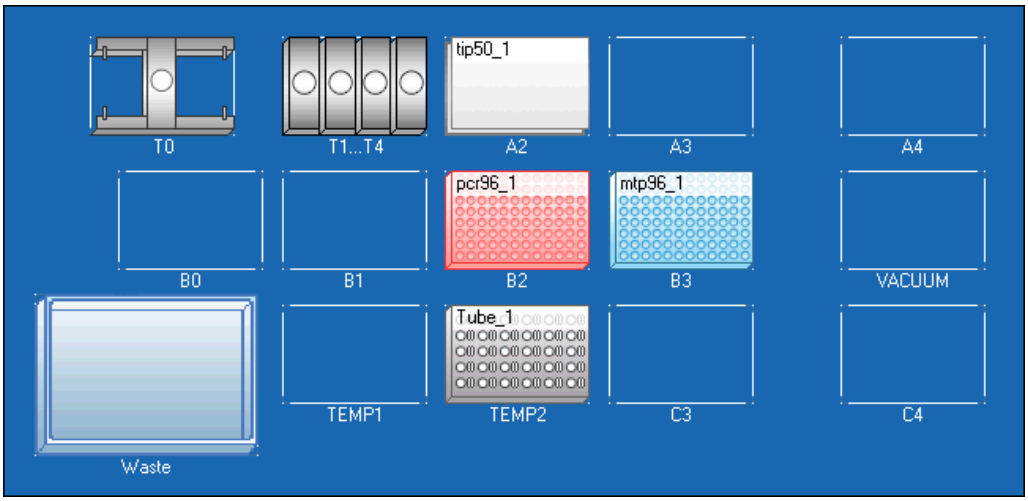


11. Position the plate in location B2.



12. In the dialog window, check whether liquid detection is set to Off, and click on OK.

The worktable is now equipped with the necessary labware for this method.



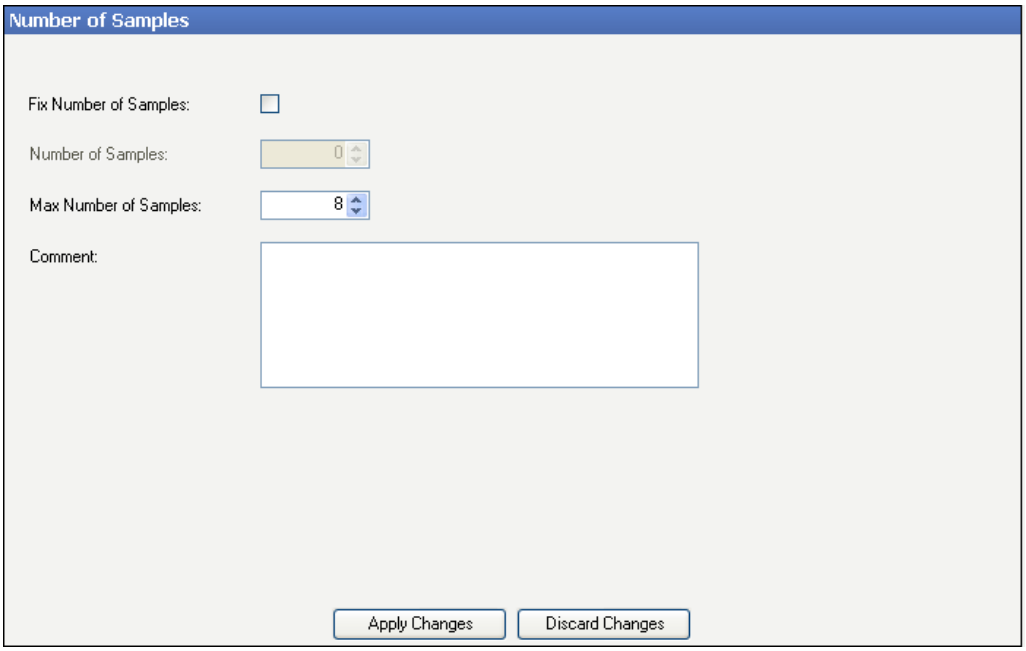
13. To save the method with this worktable assignment, click on the **Save** icon, or select **File - Save** from the main menu, or right-click on the method name and select **Save** from the context menu.

For more detailed information on supplying the worktable, please refer to the detailed description (see *Worktable tab - equip the worktable on p. 58)*.

6.2.3.3 Defining the procedure

1. In the Work tab select the Procedure tab to define the sequence of commands to be executed during the method.
2. In the Commands area in the Procedure tab double-click on the **Number of Samples** icon to add the **Number of Samples** command to the procedure.

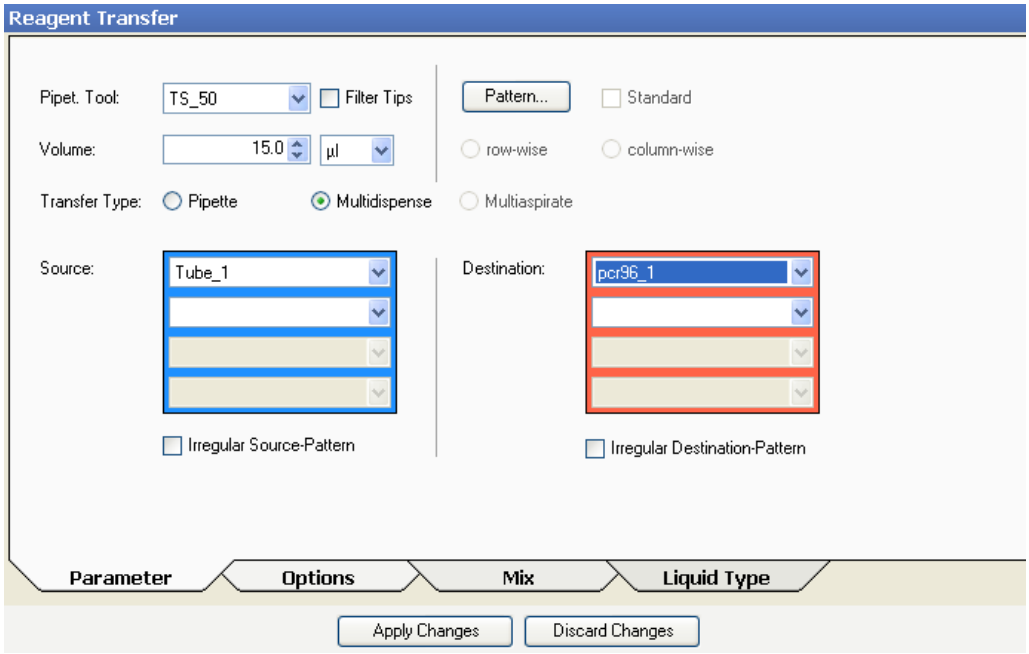
3. In the Parameter section deactivate the Fix Number of Samples checkbox and enter 8 as the maximum sample number.



4. In the Commands in the Procedure tab double click on the **Reagent Transfer** icon to add it to the program or click on the icon, move the command upwards and drop it into the next program location.

5. In the Parameter section enter the following settings for the **Reagent Transfer** command:
   - Pipet. Tool: Select TS_50.
   - Volume: enter 15 µL.
   - Select Multidispense.

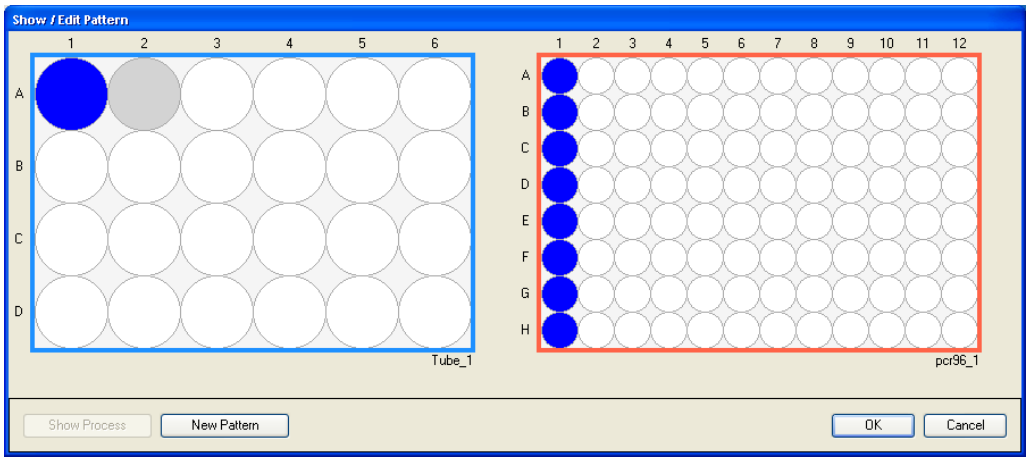
6. In the Source list select Thermorack (Tube_1) as source tube. In the Destination list select the PCR plate (pcr96_1) as destination tube.



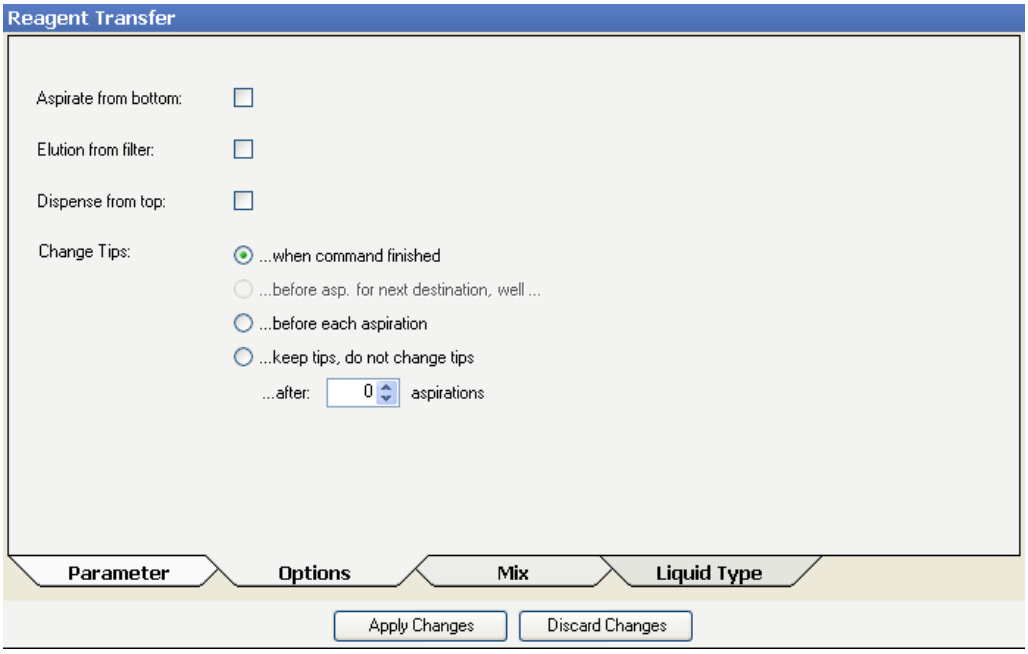
7. To define the pattern for the Reagent Transfer, click on the Pattern button.

   The Pattern window opens. The source tube labware is displayed on the left-hand side highlighted in blue. The destination tube labware is displayed on the left-hand side highlighted in red.

8. In the source tube labware click on the location with the prepared mastermix. In the destination tube labware click consecutively on the wells of the first column.



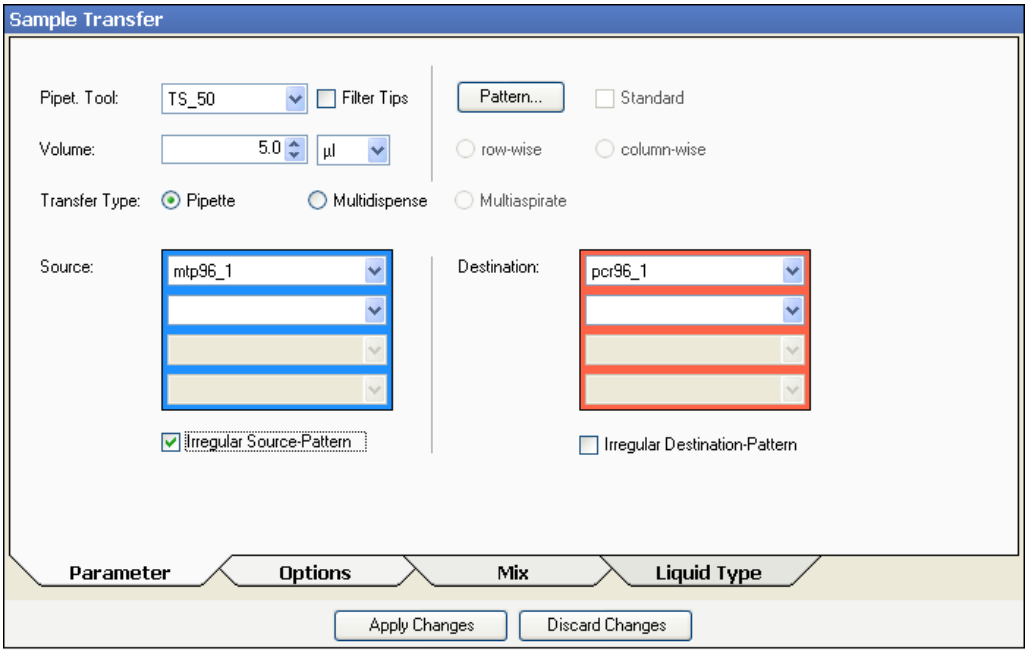
9. Click on OK to confirm the pattern and close the pattern window.
10. For the command **Reagent Transfer** click on the Options tab in the Parameter section. Under Change Tips, select the **when command is finished** option.



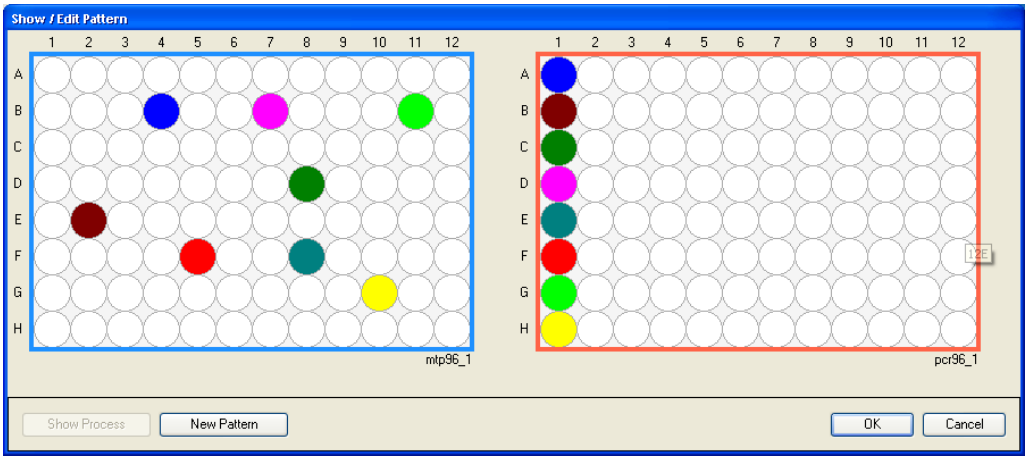
11. In the Commands in the Procedure tab double click on the **Sample Transfer** icon to add it to the program or click on the icon, move the command upwards and drop it into the next program location.

12. In the Parameter section enter the following settings for the **Sample Transfer** command:
    - Pipet. Tool: Select TS_50.
    - Volume: enter 5 µL.
    - Select Pipette.

13. In the Source list select the MTP 96 well plate (mtp96_1) as source tube and activate the Irregular Pattern option. By selecting this option, you can define an irregular pattern for the samples provided. In the Destination list select the PCR plate (pcr96_1) as destination tube.

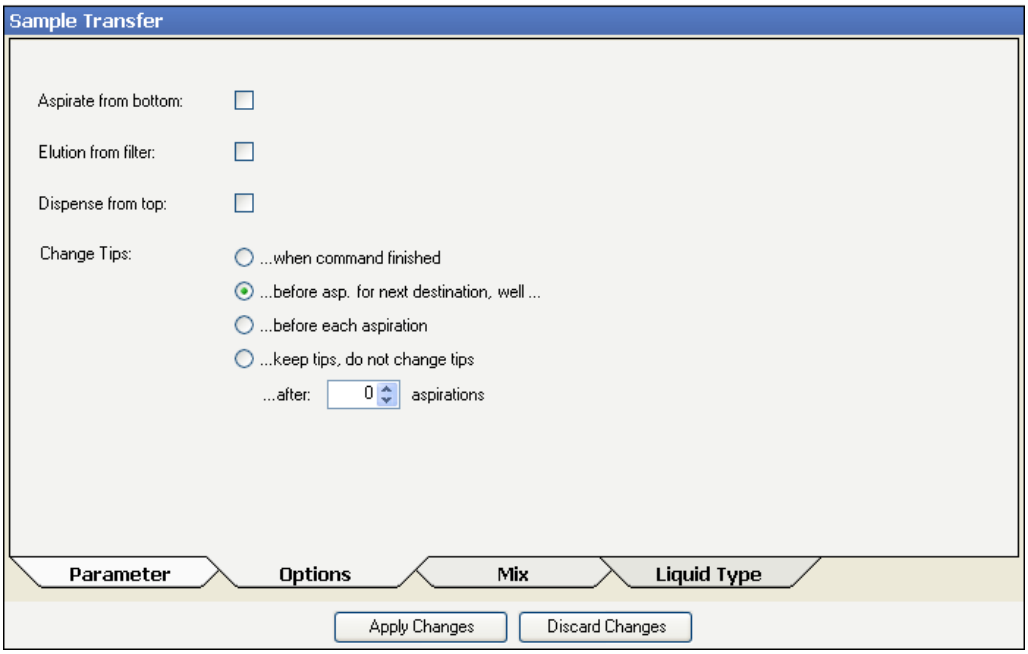


14. To define the pattern for the **Sample Transfer**, click on the Pattern button.
15. In the source tube labware click on the location containing the first sample. In the destination tube labware click on the first well (A1).
16. Change between Source and Destination to select the remaining (empty) source tube locations and the (default) destination tube locations. Because the Irregular Pattern option is only active for the source tube, individual wells of the destination tube can only be selected in the default pattern.

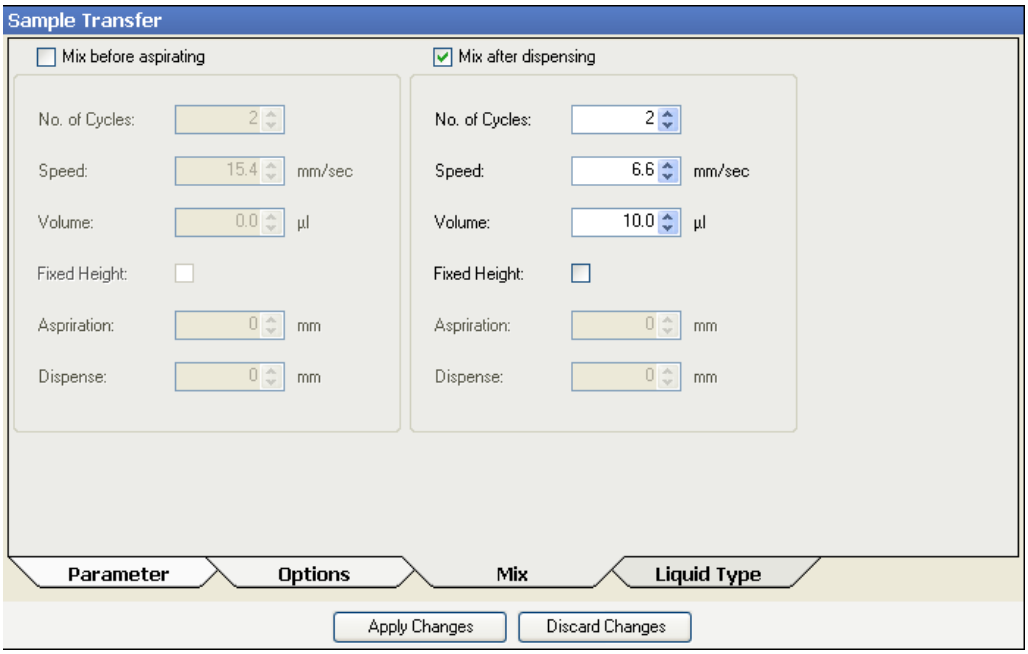


17. Click on OK to confirm the pattern and close the pattern window.

18. On the **Options** tab click in the **Parameter** section. Under **Change Tips**, select the **before aspiration for next destination** option.



19. On the **Mix** tab click in the **Parameter** section. Activate the **Mix after dispensing** option and enter 10 µL as the mixing volume and 5 as the number of mixing cycles. Leave all other settings unchanged.



20. To save the method with this procedure, click on the **Save** icon, or select **File - Save** from the main menu, or right-click on the method name and select **Save** from the context menu.

For more detailed information on defining a procedure, please refer to the detailed description (see *Procedure tab - defining a procedure on p. 62)*.

6.2.3.4 Checking and saving the method

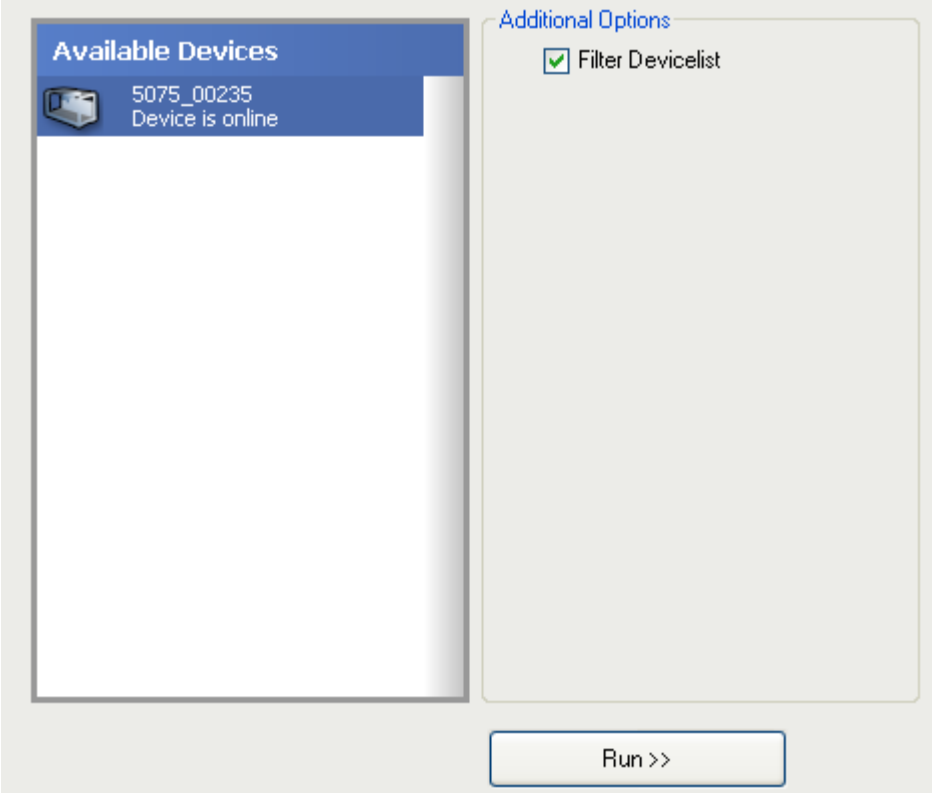
1. To check the parameter settings of the current method, select Edit - Check Method from the main menu.

   A message window opens to inform you if a parameter error was found. Correct the error and repeat the check until all errors have been corrected.

2. To save the method, click on the Save icon, or select File - Save from the main menu, or right-click on the method name and select Save from the context menu.

6.2.4 Starting the method

1. Change to the Run tab and activate the Filter Devicelist option to display only devices that are online and suitable for the method.



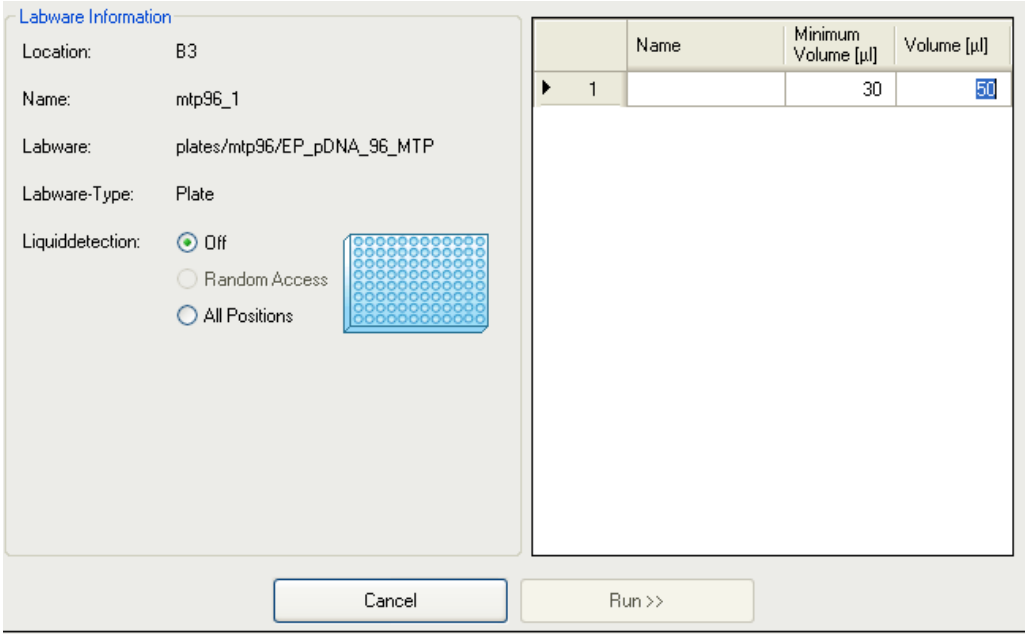
2. Select the device you want to use and click on Run.

   The method is loaded on the selected device.

   Because the command **Number of Samples** in the procedure defines a variable number of samples, you must enter the number of samples for this run manually.

3. Enter the number of samples and click on OK.
4. Check the supply of the worktable. To edit labware-specific settings for level sensor and volumes, double-click on the labware in the Worktable section of the Run tab.
5. Specify level sensor settings for this method run.
   - Levels: check the liquid levels according to the settings defined for the individual labware items.
   - Tips: check the type and quantity of tips in the tip rack.
   - Locations: check that the labware is positioned correctly on the worktable, as specified in the method.
6. Click on Run.

A volume query appears for the MTP 96 plate, as **Off** was previously set for liquid detection.



7. Enter 50 µL as the volume, and click on **Run**.

   The method starts and the display changes to the **Control** tab. The progress and current status of the method is displayed. A message appears when the method run is complete.

8. To cancel the method before it is complete click on the **Stop** icon in the **Control** tab. The method stops. Then click on the **Abort** icon to abort the method.

7 Troubleshooting

7.1 Error search

If a method does not start running after Start, check the following points. Note that the Labware on the worktable must match the method.

- Is plate or rack correctly inserted and not the wrong way round?
- Is a height adapter with the correct height being used?
- Are all the plates, racks, tips, tubs etc.shown in the display present on the worktable of the instrument?
- Are the necessary dispensing tools correctly suspended in the holders in locations T1 to T4?
- For methods with **Transport** commands: Has the gripper in location T0 been correctly positioned by hand?
- For epMotion VAC and methods using the vacuum unit: are all components of the vacuum unit correctly positioned?
- For epMotion MC: is the mat for the CycleLock level in the frame? Is the texturing of the mat facing upwards and is the mat not in contact with the base of the location?
- Are all tubes and tubs open?
- Are the tip racks filled with enough tips and have the lids been taken off the tip racks?
- Is the lid of Safe-Lock tubes correctly positioned?
- Are all the locations on the worktable of the instrument indicated as empty in the display really empty?
- Is the correct dispensing tool inserted and is it undamaged?
- Are the necessary filling quantities for the source present?
- Are racks or plates subsequently required for the parking positions ready and has their volume been entered?

7.2 General errors

7.2.1 Read error of the optical sensor

Symptom/message	Cause	Remedy
Read error of the optical sensor in detecting labware	Plates such as MTP, DWP, PCR etc. are not level on the worktable surface or have been inserted inverted.	▸ Check that the labware has been correctly inserted into the location.
Read error of the optical sensor in detecting labware	The plastic plate is not detected. The cause might be a minor unevenness in the the plastic surface. Such unevenness is usually not visible.	▸ Wipe a moist cloth several times over the detection range of the optical sensor on the labware. ▸ Repeat the Location detection with a still lightly moist surface.
Read error of the optical sensor in detecting the pipette tips	Problem when detecting pipette tips.	▸ Turn the tip rack by 180°.
Read error of the optical sensor in detecting the fluid level	Fluid surface not level (strong meniscus formation).	Carefully tap the rack or plate on the table until the surface is level.
Read error of the optical sensor in detecting the fluid level	Blisters or foam at the surface.	Remove the blisters/foam.

The detection of the location in plates takes place at the right margin.

In case of a "Location" read error of the optical sensor a dialog with the appropriate correction option is shown.

7.2.2 Dispensing error

In case of doubts about the correctness of the dispensing note the information in the appendix and all information on the selected liquid type.

7.3 Error messages

All software error messages are issued in English. This also applies if "German" is selected in the language setting for the software.

Should you require service, contact your official dealer for Eppendorf products or our sales office. You can find the addresses of our dealers on our website www.eppendorf.com. The addresses of our sales offices are listed on the penultimate page of these Instructions for Use.

Code	Symptom/message	Cause	Remedy
Message without code	Make sure there is nothing in the gripper: If any labware is held by the gripper arms remove this item manually; then press OK.	Method run was aborted; gripper is still fixed in the tool holder; before tool holder moves further (e.g., to its home position) the message appears.	If the gripper is still holding any items: 1. Remove the item manually by opening the two gripper arms manually and removing the labware manually. 2. Press the OK button. The gripper expects that the labware has been removed and now moves to the home position.
Message without code	Because all tool holder positions are occupied the tool has to be removed manually: Press OK, open the hood and be prepared to grasp the tool manually as the tool holder will open and drop the tool.	Method run was aborted; dispensing tool is still fixed in the tool holder.	▸ To remove the dispensing tool, follow the instructions.
0x0600	Tool did not find home	• Home position for the tool is not found. • No tool inserted. • Tool damaged. • PCB damaged. • Switch damaged. • Tool file does not correspond with tool.	▸ Insert tool. ▸ Check tool. ▸ Reboot and try again. ▸ If error occurs again: Call local Eppendorf Service.
0x0601	Hardware error Dosing device: final position always found	Dosing motor: home switch always on.	▸ Call local Eppendorf Service.
0x0607	Hardware error Dosing device: steps lost	Dosing motor: steps lost.	▸ Call local Eppendorf Service.
0x060D	Hardware error Dosing device: steps lost	Dosing motor: steps lost.	▸ Call local Eppendorf Service.

Code	Symptom/message	Cause	Remedy
0x060E	Tool did not find home	Tool home position is not found.	▸ No tool deployed. ▸ Tool defective. ▸ PCB defective. ▸ Switch defective. ▸ Tool file and tool do not correspond.
0x060F	Hardware error Dosing device: final position not found	Dosing motor: home switch not reached again.	▸ Call local Eppendorf Service.
0x0709	The named file is invalid for updating the device.	The file contains incorrect control information. File may be damaged while copying.	▸ New file is essential. Call local Eppendorf Service.
0x070A	The cyclic redundancy check for the named file failed.	The file contains incorrect control information. File may be damaged while copying.	▸ New file is essential. Call local Eppendorf Service.
0x070B	Error Flash Loader	The file contains incorrect control information. File may be damaged while copying.	▸ New file is essential. Call local Eppendorf Service.
0x0863	Thermomixer missing	Hardware error The thermomixer is not configured or is damaged.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x0864	Thermomixer is not configured	Hardware error The thermomixer is not configured or is damaged.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x0865	Configuration Error: Cycler and Thermomixer connected!	Hardware error It is not allowed to connect a cycler and a thermomixer to the system.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x0980	Thermomixer does not react	Hardware error The thermomixer does not respond to the system.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x0954; 0x0964; 0x0974		The control time on a temperature was exceeded.	▸ Call local Eppendorf Service.
0x0B04	Not enough space on medium	Not enough space on medium to allocate buffer for file or directory.	▸ Make sure that there is enough space on medium. ▸ Make sure that there is enough space on medium. Either delete some files or replace the medium.
0x0B05	Error reading file path	• Internal file path conversion error.	▸ Make sure that the file name and path is valid.
0x0B08	Invalid path or filename	Filename or path is invalid.	▸ Make sure that the file name and path is valid.
0x0B09	Too many files/ directories open	The number of allowed open files and directories has reached its maximum.	▸ Close other open files.
0x0B0A	File or directory does not exist	File or directory does not exist.	▸ Make sure that the file name and path is valid.
0x0B0B	No name or directory found	File path is empty.	▸ Reboot and try again.
0x0B0C	Could not open file	Filename pointer/ID invalid	▸ Reboot and try again.

Code	Symptom/message	Cause	Remedy
0x0B0D	Error opening file or directory.	File may be in use.	▸ Make sure that the file is not in use and try to open it again.
0x0B0E	Error closing file or directory.	File may be in use.	▸ Make sure that the file is not in use and try to close it again.
0x0B0F	Error opening/closing file or directory.	File may be in use.	▸ Make sure that the file is not in use and try to open/close it again.
0x0B10	Error opening file or directory.	• File may be in use, or • file is damaged.	▸ Make sure that the file is not in use and try to open it again. If error occurs again: ▸ Call local Eppendorf Service.
0x0B11	Error closing file or directory.	File may be in use.	▸ Make sure that the file is not in use and try to close it again.
0x0B14	File is in use and cannot be accessed	• Logfile is opened for viewing while the instrument tries to write into the file. • System errors.	▸ Close file; or: ▸ Call local Eppendorf Service.
0x0B15	Error opening file or directory.	File may be in use.	▸ Make sure that the file is not in use and try to open it again.
0x0B16	Error closing file or directory.	File may be in use.	▸ Make sure that the file is not in use and try to close it again.
0x0B17	Error opening file or directory.	File may be in use.	▸ Make sure that the file is not in use and try to open it again.
0x0B18	Error opening file or directory.	File may be in use.	▸ Make sure that the file is not in use and try to open it again.
0x0B40	Error opening file or directory.	File may be in use. Error opening file. Does it exist?	▸ Make sure that the file is not in use or does the file exist and try to open it again.
0x0B41	Error closing file or directory.	File may be in use.	▸ Make sure that the file is not in use and try to close it again.
0x0B42	Error reading file	File may be corrupted.	▸ Use Checkdisk
0x0B43	Error writing file	File may be corrupted.	▸ Use Checkdisk.
0x0B44	Illegal file length. Trying to read or write beyond file.	File may be corrupted.	▸ Use Checkdisk.
0x0B45	Error deleting file	File may be corrupted.	▸ Use Checkdisk.
0x0B46	Error renaming a file	File may be corrupted.	▸ Use Checkdisk.
0x0B48	Error creating file. File exists	File name has been edited that already exists.	▸ Use another name for the new file.
0x0B80	Error creating directory. Directory exists!	See error message.	▸ Use another name for the new file.
0x0B81	Error creating directory. Directory exists!	See error message.	▸ Use another name for the new file.
0x0B82	Error getting file entries	Some files may be deleted, or directory is corrupt.	▸ Use Checkdisk.
0x0B84	Error getting directory entries	Some files may be deleted, or directory is corrupt.	▸ Use Checkdisk.
0x0B85	Error listing files. Number of files in directory is not the same anymore.	Some files may be deleted, or directory is corrupt.	▸ Use Checkdisk.

Code	Symptom/message	Cause	Remedy
0x0B88	Error deleting directory.	Some files may be deleted, or directory is corrupt.	▸ Use Checkdisk.
0x0BC0	Format aborted by user	See error message.	▸ Error message was an information for the user that he had aborted.
0x0C01	Volume too large for this tool	Volume to be dispensed is too large for the selected tool. Possible causes: • Errors in tool files. • Errors in liquid type files.	▸ Call local Eppendorf Application Support.
0x0C02	Volume too small for this tool	Volume to be dispensed is too small for the selected tool. Possible causes: • Errors in tool files. • Errors in liquid type files.	▸ Call local Eppendorf Application.
0x0C08	Tool dimension unknown	Tool dimension values unknown. Labware outdated or corrupt.	▸ Make sure all labware is of the latest version.
0x1206 to 0x1210	No message text	Internal error.	▸ Call local Eppendorf Service.
0x120A	Program aborted by user	User pressed the **Abort** button during program run.	▸ Error message was an information for the user that he had aborted.
0x1221	The hood was opened while the program was stopped	See error message.	▸ Close hood.
0x1222	Transfer allowance was prematurely deactivated during program initialization	See error message.	▸ Start program again.
0x1223	Internal critical error	Hardware error. Restart of program impossible.	▸ Call local Eppendorf Service.
0x1243	Lid temperature in program is too high	Illegal value has been detected in program.	▸ Check lid temperature in program editor and start program again.
0x1244	Lid temperature in program is too low	Illegal value has been detected in program.	▸ Check lid temperature in program editor and start program again.
0x1245	Block temperature in program is too high	Illegal value has been detected in program.	▸ Check temperature in program editor and start program again.
0x1246	Block temperature in program is too low	Illegal value has been detected in program.	▸ Check temperature in program and start program again.
0x1247	Block temperature increment in program is too high	Illegal value has been detected in program.	▸ Check temperature in program and start program again.
0x1248	Block temperature increment in program is too low	Illegal value has been detected in program.	▸ Check temperature in program and start program again.
0x1249	Step time in program is too high.	Illegal value has been detected in program.	▸ Check step time in program and start program again.
0x124A	Step time in program is too low.	Illegal value has been detected in program.	▸ Check step time in program and start program again.
0x124B	Time increment in program is too high.	Illegal value has been detected in program.	▸ Check time increment in program and start program again.

Code	Symptom/message	Cause	Remedy
0x124C	Time increment in program is too low.	Illegal value has been detected in program.	▸ Check time increment in program and start program again.
0x124D	Too many cycles in Cycle command	Illegal value has been detected in program.	▸ Check value in program and start program again.
0x124E	Not enough cycles in Cycle command	Illegal value has been detected in program.	▸ Check value in program and start program again.
0x124F	Too many steps within a Cycle	Illegal value has been detected in program.	▸ Check value in program and start program again.
0x1250	Not enough steps within a cycle	Illegal value has been detected in program.	▸ Check value in program and start program again.
0x1251	Tempering ramp is too high	Illegal value has been detected in program.	▸ Check value in program and start program again.
0x1252	Tempering ramp is too low	Illegal value has been detected in program.	▸ Check value in program and start program again.
0x1253	Gradient is too high. (out of limits)	Illegal value has been detected in program.	▸ Check value in program and start program again.
0x1258	The wanted block type does not correspond with that of the cycler	Illegal value has been detected in program.	▸ Check block type in program and start program again.
0x1259	Error while choosing rack or tube at program start	Neither rack or tube were selected.	▸ Restart program and be sure to select either rack or tube.
0x1281	Vacuum not reached	The vacuum chamber or rack is leaky or no rack is inserted.	▸ Insert another rack. ▸ In other cases call local Eppendorf Service.
0x1282	Vacuum not ended	The vacuum was not generated within the defined time.	▸ Call local Eppendorf Service.
0x1283	Vacuum not ready	No vacuum chamber available or vacuum chamber not ready.	▸ Integrate or connect vacuum chamber, or: ▸ Call local Eppendorf Service.
0x1284	Temperature unit 1 not ready	Temperature unit 1 is not ready to start or not available.	▸ Call local Eppendorf Service.
0x1285	Temperature unit 2 not ready	Temperature unit 2 is not ready to start or not available.	▸ Call local Eppendorf Service.
0x1286	Temperature unit 3 not ready	Temperature unit 3 is not ready to start or not available.	▸ Call local Eppendorf Service.
0x1289	Carrier: final position in x not found	• Problems in carrier movement in x-axis (sluggish movement or no movement at all). • Light barrier for carrier in x-axis defective.	▸ Call local Eppendorf Service.
0x128A	Carrier: final position in x always found	• Problems in carrier movement in x-axis (sluggish movement or no movement at all). • Light barrier for carrier in x-axis defective.	▸ Call local Eppendorf Service.
0x128B	Carrier: steps lost in x	• Carrier was touched by the user. • Sluggishness in carrier movement in x-axis.	▸ Shut down and switch off the instrument; if error reoccurs after switching on and restarting a method run: ▸ Call local Eppendorf Service.
0x128C	Carrier: final position in y not found	• Problems in carrier movement in y-axis (sluggish movement or no movement at all). • Light barrier for carrier in y-axis defective.	▸ Call Eppendorf Service.

Code	Symptom/message	Cause	Remedy
0x128D	Carrier: final position in y always found	• Problems in carrier movement in y-axis (sluggish movement or no movement at all). • Light barrier for carrier in y-axis defective.	▸ Call local Eppendorf Service.
0x128E	Carrier: steps lost in y	• Carrier was touched by the user • Sluggishness in carrier movement in y-axis	▸ Shut down and switch off the instrument; if error reoccurs after switching on and restarting a method run: ▸ Call local Eppendorf Service.
0x128F	Carrier: final position 1 in z not found	• Problems in carrier movement in z-axis (sluggish movement or no movement at all). • Light barrier for carrier in x-axis defective.	▸ Call local Eppendorf Service.
0x1290	Carrier: final position 1 in z always found	• Problems in carrier movement in z-axis (sluggish movement or no movement at all). • Light barrier for carrier in z-axis defective.	▸ Call local Eppendorf Service.
0x1291	Carrier: final position 2 in z not found	• Problems in carrier movement in z-axis (sluggish movement or no movement at all). • Light barrier for carrier in x-axis defective.	▸ Call local Eppendorf Service.
0x1292	Carrier: final position 2 in z always found	• Problems in carrier movement in z-axis (sluggish movement or no movement at all). • Light barrier for carrier in z-axis defective.	▸ Call local Eppendorf Service.
0x1293	Carrier: final position in z wrong	• Problems in carrier movement in z-axis (sluggish movement or no movement at all). • Light barrier for carrier in z-axis defective.	▸ Call local Eppendorf Service.
0x1294	Carrier: steps lost in z	• Carrier was touched by the user. • Sluggishness in carrier movement in z-axis.	▸ Shut down and switch off the instrument; if error reoccurs after switching on and restarting a method run: ▸ Call local Eppendorf Service.
0x1295	Carrier: steps lost in z before picking up tip	• Tip was still on pipette tool when tool started to pick up a new tip. • Tip rack not placed correctly on the worktable. • Mechanical problems of carrier.	▸ Remove tips from tools. ▸ Place tip rack correctly and plane on the worktable. In other cases: ▸ Call local Eppendorf Service.
0x1296	Maximum number of tool cycles exceeded	See error message.	▸ Use a new tool.
0x1297	Danger of collision	When running the programmed application, the tool carrier system will touch racks or other labware on the worktable; e.g., during pipetting the optical sensor may touch a long tube on the adjacent position; possible reasons: • A low plate (microplate) is located next to a high tube rack. • The 50 µL or 300 µL tip is programmed to move almost to the bottom of a very long tube with another long tube in the adjacent position.	▸ Program the labware on the worktable in a way that high and low labware are not adjacent. ▸ Program the labware in a way that the 30 µL or 300 µL tip does not have to move deeply into a long vessel. ▸ If possible: use higher volumes in the long vessels. ▸ If possible: use longer tips for the long vessels.
0x1298	Tool not calibrated	The actual tool is not calibrated.	Calibrate the actual tool.
0x1299	Invalid number of samples	Value for Number of Samples not permissible.	▸ Insert an admissible value for Number of Samples.
0x129A	Tip too small	Reagent Transfer: Used tip is too small.	▸ Use a larger tip.

Code	Symptom/message	Cause	Remedy
0x129B	Source vessel too small	Reagent Transfer: Used source vessel is too small.	▸ Use a larger vessel.
0x12A0	Vacuum unit not ready	Vacuum unit cannot be addressed by the software.	▸ Call local Eppendorf Service.
0x12A1	Vacuum not released	Ventilation of the vacuum unit after switching off the pump is too slow.	▸ Call local Eppendorf Service.
0x12A2	Check levels in vacuum command: Wells in filter plate not empty	Wells of the filter plate plug while applying vacuum.	▸ Follow the instructions on the control panel display.
0x12A4	Labware in vacuum manifold is not composed of three parts (filter plate, frame, collection labware)	When applying vacuum three items must be in the vacuum unit (filter plate above vac frame above collection plate or tub).	▸ See explanation in "Cause".
0x12A5	Well pattern of upper and lower rack do not fit	Vacuum unit: Well geometry of filter plate and collection plate must correspond to each other (e.g., 96 well filter plate and 96 well collection plate). Exception: Collection plate may be replaced by a tub.	▸ See explanation in "Cause".
0x12B1	Temperature unit in location C1 not ready	Temperature unit 1 cannot be addressed by the software.	▸ Call local Eppendorf Service.
0x12B2	Temperature unit in location C2 not ready	Temperature unit 2 cannot be addressed by the software.	▸ Call local Eppendorf Service.
0x12B3	Temperature unit in location C3 not ready	Temperature unit 3 cannot be addressed by the software.	▸ Call local Eppendorf Service.
0x12B4	Temperature unit in location C1 not active	In wait command the wait for temperature parameter was edited for location C1 although no temperature command for C1 had been edited before.	▸ Insert temperature command before wait command or delete the wait for temperature parameter for this location.
0x12B5	Temperature unit in location C2 not active	In wait command the wait for temperature parameter was edited for location C2 although no temperature command for C2 had been edited before.	▸ Insert temperature command before wait command or delete the wait for temperature parameter for this location.
0x12B6	Temperature unit in location C3 not active	In wait command the wait for temperature parameter was edited for location C3 although no temperature command for C3 had been edited before.	▸ Insert temperature command before wait command or delete the wait for temperature parameter for this location.
0x12B7	Temperature unit in location C1 too hot for labware (temperature command in this method)	The temperature of location C1 (according to a temperature command in this application) is too high for the labware placed on this location.	▸ Select a labware item that is more resistant to high temperatures (e.g. made from polypropylene or polycarbonate).
0x12B8	Temperature unit in location C2 too hot for labware (temperature command in this method)	The temperature of location C2 (according to a temperature command in this application) is too high for the labware placed on this location.	▸ Select a labware item that is more resistant to high temperatures (e.g. made from polypropylene or polycarbonate).
0x12B9	Temperature unit in location C3 too hot for labware (temperature command in this method)	The temperature of location C3 (according to a temperature command in this application) is too high for the labware placed on this location.	▸ Select a labware item that is more resistant to high temperatures (e.g. made from polypropylene or polycarbonate).

Code	Symptom/message	Cause	Remedy
0x12BA	Temperature unit in location C1 too hot for labware (temperature command in previous method)	The temperature of location C1 (according to a temperature command in a previous application with parameter keep temperature after method run set active) is too high for the labware placed on this location.	▸ Select a labware item that is more resistant to high temperatures (e.g. made from polypropylene or polycarbonate). ▸ Change previous application not to keep temperature after application run.
0x12BB	Temperature unit in location C2 too hot for labware (temperature command in previous method)	The temperature of location C2 (according to a temperature command in a previous application with parameter keep temperature after method run set active) is too high for the labware placed on this location.	▸ Select a labware item that is more resistant to high temperatures (e.g. made from polypropylene or polycarbonate). ▸ Change previous application not to keep temperature after application run.
0x12BC	Temperature unit in location C3 too hot for labware (temperature command in previous method)	The temperature of location C3 (according to a temperature command in a previous application with parameter keep temperature after method run set active) is too high for the labware placed on this location.	▸ Select a labware item that is more resistant to high temperatures (e.g. made from polypropylene or polycarbonate). ▸ Change previous application not to keep temperature after application run.
0x12C0	Cycler is turned off	Cycler cannot be addressed by the software; cycler may be turned off.	▸ Switch cycler on. If error occurs again: ▸ Call local Eppendorf Service.
0x12C1	Cycler is not ready	Command cycler cannot start because the cycler is not ready (e.g. still running).	▸ Wait until cycler is ready before starting a new application using the cycler. ▸ If the reason is not obvious for this error message, call local Eppendorf Service.
0x12C2	Cycler lid is not open	Command cycler cannot start because the cycler lid is not open.	▸ Call local Eppendorf Service.
0x12C3	Labware in cycler must be composed of two parts (PCR plate and PCR lid)	Before starting the cycler command the cycler must be equipped with a PCR plate and a CycleLock (PCR lid = CycleLock) above the plate.	▸ See explanation in "Cause".
0x12C4	Upper part of the labware stack in cycler must be a PCR lid	See explanations for error message 0x12C3.	▸ See explanations for error message 0x12C3.
0x12C5	Parameter conflict: 1000 ul tip cannot be used for destination or source cycler	Cycler is not accessible for 1000 µL tips.	▸ Change application. Or: ▸ Use 300 µL or 50 µL tips.
0x12C6	Parameter conflict: Rack cannot be transported from source cycler	See error message.	▸ Transport rack manually.

Code	Symptom/message	Cause	Remedy
0x12D0	Parameter conflict: Elution volume too large for this tool	Sample transfer with elution from filter option: Volume to be aspirated is too large for the tip used.	▸ Select a tip large enough for picking up the liquid as well as the additional volume of air to be aspirated when using this option.
0x12D1	Parameter conflict: Elution volume too large for destination tube or well	Option elution from filter: volume is too large for the vessel used.	▸ Select a tool large enough when using this option.
0x12E0	Error in system configuration	Error in system configuration.	Correct system configuration.
0x12E1	Parameter conflict: Prewetting not possible when aspirate from bottom is selected	See error message.	▸ Change application.
0x12E2	Parameter conflict: Prewetting not possible when dispense from top is selected	See error message.	▸ Change application.
0x12E3	Parameter conflict: Prewetting not possible when elution from filter is selected	A liquid type using a prewetting step (e.g., ethanol 98%) cannot be used in combination with the elution from filter parameter in a sample transfer command.	▸ Change application.
0x12E4	Transport of labware: danger of collision	Danger of collision when transporting a stack of several racks. The upper rack would collide with the carrier.	▸ Do not pile more than 5 racks in a location.
0x12E6	Level too high	The liquid level would be higher than the vessel after dispensing.	▸ Adjust the liquid to be dispensed to the vessel.
0x12E7	Opening the hood is not allowed when putting down tool. Switch off power, then switch on again to restart method.	See error message.	▸ See error message.
0x12F1	No communication with thermomixer	Hardware error The thermomixer may be damaged.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x12F3	Thermomixer is too hot for labware (temperature command in this method)	The temperature unit of the thermomixer is to hot for the selected labware	Choose a lower temperature
0x12F4	The thermomixer is too hot for labware (temperature command in previous method)	The temperature unit of the thermomixer is to hot for the selected labware	Choose a lower temperature
0x12F7	Waiting for thermomixer	The procedure is waiting for the thermomixer.	Wait until thermomixer function has ended
0x12F8	The selected mixing speed is not possible with this labware	The mixing speed is not allowed for the selected labware	Select another labware or mixing speed

Code	Symptom/message	Cause	Remedy
0x1500	Too big vessel index in location: ...	A tube is to be accessed for which the index is greater than the number of tubes on the plate/ rack/holder.	▸ Error during creation of the application.
0x1503	Tool not placed ...	Optical sensor: A tool that is needed for the application run was not found on the worktable.	▸ Put the tool on the tool holder of the worktable.
0x1504	<rack name> is not accessible for tools in location ...	Rack is a lower part of a labware stack; therefore, the tool has no access.	▸ Change application so that the rack is accessible.
0x1509	Liquid volume too large for vessel in location:...	Total volume supplied in a source vessel is larger than needed or larger than vessel.	▸ Provide less volume in the vessel. ▸ Change application. ▸ When verifying the total volume needed for the source or destination, take into account additional aspirated volume in case of multidispense mode(see *Important volume terms for tubes and wells on p. 22)*.
0x150A	Liquid volume too low for vessel in location: ...	Total volume supplied by the user in a source vessel is smaller than needed for a sample transfer, reagent transfer or mix command (total volume = volume to be aspirated + remaining volume for this vessel + (in case of multidispense mode:) additional aspirated volume.	▸ Calculate the total volume for the source or destination vessel and select a suitable vessel. Regarding additional aspirated volume in case of multidispense mode, refer to manual (see *Important volume terms for tubes and wells on p. 22)*. ▸ Consider that the software may calculate higher remaining volumes in some cases to avoid crashes. ▸ Set liquid detection to off for racks that are on park positions at the beginning of the procedure.
0x150B	Optical sensor: Liquid volume too low in location: ...	See above (error 0x150A).	▸ See above (error 0x150A).
0x150D	Optical sensor: Plate could not be found in location: ... Optical sensor: Rack could not be found in location: ...	The rack programmed for this location could not be found by the optical sensor; possible causes: • Rack not placed onto location (wrong rack code or wrong rack height). • Rack in wrong orientation. • Problems related to the optical sensor function.	▸ Place the rack onto the locations as edited in the corresponding application; or: ▸ Make sure that the rack is placed plane on the worktable surface; or: ▸ Rotate rack 180° (front to back) and place it back onto the worktable location; or: ▸ Call local Eppendorf Service.

Code	Symptom/message	Cause	Remedy
0x150E	Optical sensor: Tips could not be found in location ...	The tip rack programmed for this location could not be found by the optical sensor; possible causes: • Tip rack not placed onto location. • Problems related to the optical sensor function.	▸ Place the tip rack onto the locations as edited in the corresponding application; or: ▸ Call local Eppendorf Service.
0x1510	Optical sensor: Nothing could be found in location:	See error message.	▸ Place the labware programmed for this location on the worktable. If error occurs again: ▸ Call local Eppendorf Service.
0x1512	Tip type ... is not placed on the worktable	Tips that are needed according to the application are not available on the worktable.	▸ Place the tip tray programmed for this location on the worktable. If error occurs again: ▸ Call local Eppendorf Service.
0x1513	Position is out of range	The position to be addressed by the tool carrier is outside of its available range.	▸ Change application. If error occurs again: ▸ Call local Eppendorf Service.
0x1514	Optical sensor: Rack in wrong orientation in location ...	The tub holder has been placed onto the worktable in the wrong direction.	▸ Rotate tub holder 180° and place it back onto the worktable; restart the application.
0x1515	Tool cannot be used for rack in location ...	Distance between tip cones of the liquid handling tool does not match the distance between vessels (e.g., 24 tubes - rack does not fit the 8-channel tool).	▸ Change application.
0x1516	No vessel in location: ...	Vessels that are needed according to the application are not available on the worktable (vessel/rack combination).	▸ Place the vessel/rack combination programmed for this location on the worktable. If error occurs again: ▸ Call local Eppendorf Service.
0x1518	Rack is not tangible in location: ...	The item cannot be picked up by the gripper.	▸ Change application.
0x1519	Tip is too thick for vessel in location: ...	Diameter of the destination vessel is too small for the tip when dispensing the liquid.	▸ Select other tips or vessels in the application. ▸ Select dispense from top in the options of the liquid handling command.
0x151A	Optical sensor: There is a cap on vessel in location: ...	The optical sensor has detected a cap on a vessel when trying to detect a liquid level.	▸ Remove the cap from the vessel and start the run again.
0x151B	Optical sensor: There is a wrong vessel in location: ...	Relates to vessels that are equipped with a readable code (e.g. Eppendorf tubs): The rack programmed for this location could not be found by the optical sensor; possible causes: • Wrong vessel. • Problems related to the optical sensor function.	▸ Place the vessel onto the location as edited in the corresponding application; or: ▸ Call local Eppendorf Application Support.

Code	Symptom/message	Cause	Remedy
0x151C	Optical sensor: Vessel too high for level detection in location: ...	Level detection for very high vessels is not possible.	▸ Switch off the level detection for this vessel. ▸ Use level detection only for vessel/rack equipment with a total height below 103 mm.
0x151E	Detected volume is out of detection range ...	Normally a system/hardware error (malfunction of the optical sensor); but may also be caused by filling a vessel up to the total vessel height.	▸ Do not fill vessels above the specified maximum filling volume. In other cases: ▸ Call local Eppendorf Service.
0x151F	Labware stack too high in location: Maximum pieces which may be piled:	A maximum of 5 racks can be stacked in a location. Placing more than 5 racks in a location.	▸ Do not stack more than 5 racks in a location.
0x1522	Transport of the selected labware to this position or stack is not allowed Position xxx	Different reasons to forbid this transport; main reason: transport of the selected labware to this position or stack might result in instability of the stack, or the resulting stack might become too high.	▸ Change application.
0x1523	Labware stack too high in location: xxx Maximum height: xxx mm	Total height of labware stacks (like plates on adapters) is too high.	▸ Edit application to avoid too high labware stacks.
0x1525	Filter plate wells are not empty	Using the `check levels` option in the `vacuum` command, the optical sensor detected residual liquid in one of the filter wells.	▸ Follow the instructions on the display screen.
0x1526	No free position for deposition of tool available	When trying to deposit the dispensing tool after use the tool holder did not find a free position for the tool.	▸ Clear at least one position on the worktable to accept a dispensing tool.
0x1528	Method program may not use more than four dispensing tools	See error message.	▸ If more than 4 dispensing tools are needed, divide the application into two applications that use no more than 4 dispensing tools.
0x1529	Dispensing tool could not be found. Dispensing tool required for this method:...	See error message.	▸ Provide the dispensing tool that is needed on the worktable at its proper position.
0x152A	Gripper could not be found	See error message.	▸ Provide the gripper on the worktable at its proper position.
0x152B	Plates cannot be transported by the gripper from the cycler location.	A `transport` command to move a PCR plate from the cycler is not allowed.	▸ Change application.
0x152D	Tip too short Select other tips or vessels in the method.	Tip does not reach the liquid level at the beginning or during the course of the liquid handling command.	▸ Select other tips or vessels in the application.
0x152F	Labware stack too high in location: xxx Maximum pieces which may be piled: 5	A maximum of 5 racks can be piled in a location. After a `transport` command the labware stack would be too high.	▸ Change application.

Code	Symptom/message	Cause	Remedy
0x1530	Dosing in pile not allowed in location: xxx	See error message.	▸ Change application.
0x1531	Transport of this pile not allowed in location: xxx	Do not transport a stack.	▸ Change application.
0x1581	Optical sensor: Liquid level could not be detected in location: ...	Error in level detection.	▸ Repeat measurement.
0x1600	Header not detected	Cycler editor: Header command not detected File damaged.	▸ Call local Eppendorf Service.
0x1601	Load filename	Command in the file is not a cycler command File damaged.	▸ Call local Eppendorf Service.
0x1602	Program too long	Maximum size of steps is reached.	▸ Delete commands that are not necessary before insert new commands.
0x1603	Load *filename*	• Cycler editor: End command not found. • File damaged.	▸ Call local Eppendorf Service.
0x1604	Load *filename*	• Parameters of a command are not loadable. • File damaged.	▸ Call local Eppendorf Service.
0x1700	Liquid volume too low for vessel in location: ...	Total volume supplied by the user in a source vessel is smaller than needed for a sample transfer, reagent transfer or mix command (total volume = volume to be aspirated + remaining volume for this vessel + (in case of multidispense mode:) additional aspirated volume.	▸ Calculate the total volume for the source or destination vessel and select a suitable vessel. Regarding additional aspirated volume in case of multidispense mode, refer to manual (see *Important volume terms for tubes and wells on p. 22)*. ▸ Consider that the software may calculate higher remaining volumes in some cases to avoid crashes. ▸ Set liquid detection to off for racks that are on park positions at the beginning of the procedure.
0x1701	Liquid volume too large for vessel in location:...	Total volume supplied in a source vessel is larger than needed or larger than vessel.	▸ Provide less volume in the vessel. ▸ Change application. ▸ When verifying the total volume needed for the source or destination, take into account additional aspirated volume in case of multidispense mode(see *Important volume terms for tubes and wells on p. 22)*.
0x1900	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1901	Loading error	File damaged.	▸ Call local Eppendorf Service.
0x1902	Loading error	File damaged.	▸ Call local Eppendorf Service.

Code	Symptom/message	Cause	Remedy
0x1903	Loading error	File damaged.	▸ Call local Eppendorf Service.
0x1904	The following labware has been deleted: ...	Edit mode: The worktable was changed after an application had been programmed; thus, the labware defined in a command is no longer available.	▸ Change the source or destination in the parameter of the respective command in accordance to match the worktable. In this case the pattern also has to be re-edited; ▸ The labware has to be reprogrammed in the worktable.
0x1905	Loading error	File damaged.	▸ Call local Eppendorf Service.
0x1906	Loading error	File damaged.	▸ Call local Eppendorf Service.
0x1907	Loading error	File damaged.	▸ Call local Eppendorf Service.
0x1908	The method was written with a newer program structure. You must update your software if you want to edit this method	See Error message.	▸ Update your software, or: ▸ Call local Eppendorf Service.
0x1909	Loading error	File damaged.	▸ Call local Eppendorf Service.
0x190A	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x190B	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x190C	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x190D	The following labware is not selected in the Labware File window: ...	Edit mode/worktable: The chosen labware is not available in the labware collection that had been selected for your lab. Possible cause for this error message: The labware has been deselected in the Labware File window.	▸ Select the respective labware in the Labware File window. You need to have the appropriate user rights. If you do not have the necessary user rights ask your administrator.
0x190E	The following tool is not selected in the Labware File Window: ...	Edit mode/procedure: The chosen tool is not available in the labware collection that had been selected for your lab. Possible cause for this error message: The labware has been deselected in the Labware File window.	▸ Select the respective labware in the Labware File window. You need to have the appropriate user rights. If you do not have the necessary user rights ask your administrator.
0x190F	The following liquid is not selected in the Labware File Window: ...	Edit mode/procedure: The chosen liquid option is not available in the labware collection that had been selected for your lab. Possible cause for this error message: The labware has been deselected in the Labware File window.	This selection could only be deactivate/activate by Eppendorf Service. ▸ Call local Eppendorf Service.

Code	Symptom/message	Cause	Remedy
0x1910	The method was written for another workstation configuration The position of the following labware is not available on this worktable	The position of required labware is not available on this device e.g. you have a 5075 MC and the application was written on an 5075 LH and labware were assigned to positions A4, B4 and C4 are now occupied by a cycler.	▸ Load the concerned application on a compatible device, or ▸ Modify the application until it matches the available device.
	The position of the following labware is not allowed anymore yyy in location: xxx	Edit mode/worktable: The chosen labware may not be placed on the selected position anymore. Possible cause for this error message: The application has been written with a former version of the software.	▸ Place the respective labware on another position.
0x1911	The following labware has been changed, so that the pattern does not fit anymore: xxx	As it is possible to change the order or contents of an “Equipped Holder” combination, it can happen that the recent pattern of a command does not fit the new positions of the tubes.	▸ Either change the order or contents of the “Equipped Holder” combination back to the original. Or change the pattern in the command.
0x1980 to 0x1983	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1984	No parameter for tool/ liquid.	Edit mode/parameter in command Sample Transfer: A special file for the selected combination of tool and liquid type is not available.	▸ Select another tool or another liquid type.
0x1985	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1986	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1A02	The name is already used for another labware	Edit mode / labware: The same name has been defined for a different rack or another labware item.	▸ Enter a different name.
0x1A03	This position is not available for the selected labware	Edit mode/worktable: Certain worktable positions are not allowed for certain labware (e.g., tips can only be placed in the rear of the worktable).	▸ Place the selected labware in another location.
0x1A04	The selected labware may not be stacked on top of labware already placed	Edit mode/worktable: Building of labware stacks on the worktable is restricted to certain labware combinations (e.g., thermorack above thermorack does not make sense).	▸ See "Cause".
0x1A05	Maximum number of labware stacked: 5	Edit mode/worktable: Certain labware build a pile which contains too many when placed on certain labware.	Place the selected labware in another location.

Code	Symptom/message	Cause	Remedy
0x1A06	Labware stack too high in location: xxx Maximum height: xxx mm	Edit mode/worktable: Labware stacks on the worktable may not exceed a maximum height limit (e.g., plates on adapters is allowed; reservoir holder on adapters is not allowed because the stack would become too high).	▸ See "Cause".
0x1A10	8-channel tool cannot be used for this source rack	Edit mode/parameter in command Sample Transfer: Source rack does not fit to 8-channel-tool (e.g.: 24-well-plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x1A11	8-channel tool cannot be used for this destination rack.	Edit mode/parameter in command Sample Transfer: Destination rack does not fit the 8-channel tool (e.g. 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x1A12	No source or destination selected	Edit mode/parameter in command Sample Transfer: Source or destination rack has not been selected.	▸ Select source or destination, respectively.
0x1A15	Invalid entry for movement blow (0 ... 100)	Edit mode/parameter in transfer command: A value beyond the allowed range has been entered for the parameter Movement Blow.	▸ Enter a value between 0 and 100%.
0x1A16	Invalid entry for delay blow (0 ... 9999)	Edit mode/parameter in transfer command: A value beyond the allowed range has been entered for the parameter Delay Blow.	▸ Enter a value between 0 and 9999 msec.
0x1A17	Invalid entry for speed aspiration (0.2 ... 110)	Edit mode/parameter in transfer command: A value beyond the allowed range has been entered for the parameter speed aspiration.	▸ Enter a value between 0.2 and 110 mm/sec.
0x1A19	Invalid entry for speed blow (0.2 ... 110)	Edit mode/parameter in transfer command: A value beyond the allowed range has been entered for the parameter Speed Blow.	▸ Enter a value between 0.2 and 110 mm/sec.
0x1A1A	Invalid entry for initial stroke (0 ... 100)	Edit mode/parameter in transfer command: a value beyond the allowed range has been entered for the parameter initial stroke.	▸ Enter a value between 0 and 100%.
0x1A20	8-channel tool cannot be used for this source rack	Edit mode/parameter in command Reagent Transfer: Source rack does not fit the 8-channel tool (e.g., 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x1A21	8-channel tool cannot be used for this destination rack	Edit mode/parameter in command Reagent Transfer: Destination rack does not fit the 8-channel tool (e.g., 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x1A22	No source or destination selected	Edit mode/parameter in command Reagent Transfer: Source or destination rack has not been selected.	▸ Select source or destination, respectively.
0x1A30	8-channel tool cannot be used for this source rack	Edit mode/parameter in command Pool: Source rack does not fit the 8-channel tool (e.g., 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.

Code	Symptom/message	Cause	Remedy
0x1A31	8-channel tool cannot be used for this destination rack	Edit mode/parameter in command Pool: Destination rack does not fit the 8-channel tool (e.g. 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x1A32	No source or destination selected	Edit mode/parameter in command Pool: Source or destination rack has not been selected.	▸ Select source or destination, respectively.
0x1A40	8-channel tool cannot be used for this source rack	Edit mode/parameter in command PoolOneDest: Source rack does not fit the 8-channel tool (e.g., 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x1A41	8-channel tool cannot be used for this destination rack	Edit mode/parameter in command PoolOneDest: Destination rack does not fit the 8-channel tool (e.g. 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x1A42	No source or destination selected	Edit mode/parameter in command PoolOneDest: Source or destination rack has not been selected.	▸ Select source or destination, respectively.
0x1A50	8-channel tool cannot be used for this source rack	Edit mode/parameter in command Dilute: Source rack does not fit the 8-channel tool (e.g., 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x1A51	8-channel tool cannot be used for this destination rack	Edit mode/parameter in command Dilute: Destination rack does not fit the 8-channel tool (e.g. 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x1A52	No source or destination selected	Edit mode/parameter in command Dilute: Source or destination rack has not been selected.	▸ Select source or destination, respectively.
0x1A61	8-channel tool cannot be used for this rack	Edit mode/parameter in command Mix: Rack does not fit the 8-channel tool (e.g., 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x1A62	No rack selected	Edit mode/parameter in command Mix: Rack has not been selected.	▸ Select rack, respectively.
0x1A65	Invalid entry for speed (0.2 ... 110)	Edit mode/parameter in command Mix: A value beyond the allowed range has been entered for the parameter Speed .	Enter a value between 0.2 and 110 mm/sec.
0x1A70	This position is already occupied	Edit mode/pattern: When editing the pattern you have tried to select a certain position that is already occupied.	▸ Follow the direction of the edited pattern and move to a different position.
0x1A73	Delete function only available for last entry	Edit mode/pattern: Deleting a pattern position you just entered is only possible as long as you did not leave the source (or the destination, respectively).	▸ If you have to delete this position which is no more available you must edit a new pattern from the beginning (softkey new pattern or cancel).
0x1A75	A rack may only have 384 positions	Edit mode/pattern: Not enough software memory available for editing the pattern. Maximum possible positions are 384.	▸ Choose another rack, because the chosen rack has too many positions.

Code	Symptom/message	Cause	Remedy
0x1A76	8-channel tool cannot be used for this module rack	Edit mode/pattern: Rack does not fit the 8-channel tool (e.g., Tubs + Modules (equip) + Holders-combination with positions all less than 8 in Modules).	▸ Choose another rack or another tool.
0x1A77	No module rack or tubes found	Edit mode/pattern: Rack does not have any positions (e.g., Tubs + Modules (equip) + Holders-combination with positions all less than 1 in Modules).	▸ Choose another rack.
0x1A78	Number of tubes not supported	Edit mode/pattern: One or more Modules have 3, 5, 6, 7 or more than 8 positions. This is not supported.	▸ Choose another rack.
0x1A80	Invalid entry for minutes (0 ... 99)	Edit mode/parameter in command Wait: A value beyond the allowed range has been entered for the parameter minutes.	▸ Enter a value between 0 and 99 minutes.
0x1A81	Invalid entry for seconds (0 ... 59)	Edit mode/parameter in command Wait: A value beyond the allowed range has been entered for the parameter seconds.	▸ Enter a value between 0 and 59 seconds.
0x1A90	Selecting more than one rack as Source or as Destination: All source racks (or all destination racks, resp.) must have the same well pattern	Edit mode/parameter in transfer command: The selected labwares have a different amount of wells.	▸ Choose another rack.
0x1A91	Selecting more than one rack as Source or as Destination: Rack was already selected as source rack (or as destination rack, resp.)	Edit mode/parameter in transfer command: A labware may not be selected more than once.	▸ Enter a value between 0 and 110 degrees.
0x1AB0	Invalid entry for minutes (0 ... 99)	Edit mode/parameter in command Vacuum: A value beyond the allowed range has been entered for the parameter minutes.	▸ Enter a value between 0 and 99 minutes.
0x1AB1	Invalid entry for seconds (0 ... 59)	Edit mode/parameter in command Vacuum: A value beyond the allowed range has been entered for the seconds parameter.	▸ Enter a value between 0 and 59 seconds.
0x1AB2	Invalid entry for vacuum pressure (1 ... 90) kPa and (10 ... 900) mbar resp.	Edit mode/parameter in command Vacuum: A value beyond the allowed range has been entered for the seconds parameter.	▸ Enter a value between 0 and 59 seconds.
0x1AC0	Only cycler program possible	Edit mode/in command Start Cycler: The selected application must be a cycler program.	▸ Please select a cycler program.
0x1AD0	Invalid entry for lid temperature (37 ... 110)	Edit mode/parameter in command Temp Cycler: A value beyond the allowed range has been entered for the parameter Temperature.	▸ Enter a value between 37 and 110 degrees.
0x1AD1	Invalid entry for block temperature (4.0 ... 99.0)	Edit mode/parameter in command Temp Cycler: A value beyond the allowed range has been entered for the parameter Temperature.	▸ Enter a value between 4.0 and 99.0 degrees.

Code	Symptom/message	Cause	Remedy
0x1AE0	Invalid entry for mixing speed (0 ... 2000)	Edit mode / parameter in command ”Thermomixer”: a value beyond the allowed range has been entered for the parameter ”speed”	Enter a value between 0 and 2000 rpm
0x1AE1	Invalid entry for minutes (0 ... 120)	Edit mode / parameter in command ”Thermomixer”: a value beyond the allowed range has been entered for the parameter ”minutes”	Enter a value between 0 and 120 minutes
0x1AE2	Invalid entry for seconds (0 ... 59)	Edit mode / parameter in command ”Thermomixer”: a value beyond the allowed range has been entered for the parameter ”seconds”	Enter a value between 0 and 59 seconds
0x1AE3	Invalid entry for temperature (4 ... 110)	Edit mode / parameter in command ”Thermomixer”: a value beyond the allowed range has been entered for the parameter ”temperature”	Enter a value between 4 and 110 degrees
0x1C00 to 0x1C09	File could not be read	File damaged.	▸ Call local Eppendorf Service.
0x1C0B	Sample number too large	Run mode: The number of samples you entered will fill more than one rack (source or destination, respectively) based on the programmed pattern.	▸ Start the application again and enter a lower number of samples; or: ▸ Enter the edit mode and program a pattern that together with the number of samples you want to run will not extend beyond one rack.
0x1C0C	File could not be read	File damaged.	▸ Call local Eppendorf Service.
0x1C0D	You must clear old pattern first Press "new pattern"	Edit mode/pattern: You tried to change a stored pattern before deleting the old pattern.	▸ Delete the old pattern by pressing the button new pattern.
0x1C0E	You must go forward	Edit mode/pattern: When entering the pattern, the order of edited locations in the source (or destination, respectively) must be from left to right or from the top of the pattern downwards (i.e., move only in columns or in rows).	▸ See explanation in "Cause".
0x1C0F	You may only move horizontally or vertically	Edit mode/pattern: When entering the pattern the order of edited locations in the source (or destination, resp.) must be from the left to right or from top of the pattern downwards (i.e., move only in columns or in rows). Note: Error message may also occur when working with an 8-channel tool and editing another position than the upper ones (see error code 0x1C1F).	▸ See explanation in "Cause".
0x1C10	Pattern for replicates of first sample too complex	Edit mode/pattern: The pattern algorithm cannot handle this pattern.	▸ Enter a simpler pattern if possible. In case this is not possible: ▸ Call local Eppendorf Application Support.

Code	Symptom/message	Cause	Remedy
0x1C11	Pattern too complex	Edit mode/pattern: The pattern algorithm cannot handle this pattern. Note: See note in error 0x1C0F.	▸ Enter a simpler pattern if possible. In case this is not possible: ▸ Call local Eppendorf Application Support.
0x1C12	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1C13	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1C14	Pattern must fit in rows or columns	Edit mode/pattern: The basic unit of the pattern you tried to enter extends beyond a row or a column. This cannot be handled by the pattern algorithm.	▸ Enter a simpler pattern if possible. In case this is not possible: ▸ Call local Eppendorf Application Support.
0x1C15	Pattern too complex	Edit mode/pattern: The pattern algorithm cannot handle this pattern. Note: See note in error 0x1C0F.	▸ Enter a simpler pattern if possible. In case this is not possible: ▸ Call local Eppendorf Service.
0x1C16	This position is already occupied	Edit mode/pattern: When editing the pattern you have tried to select a certain rack position that is already occupied.	▸ Following the edited pattern move to a different rack position.
0x1C17	You must start with the source	Edit mode/pattern: When editing a pattern you must start with the source.	▸ See explanation in "Cause".
0x1C18	Please enter a source now	Edit mode/pattern: In the destination rack, you tried to enter more replicates than you had sources.	▸ Enter the same number of replicates for all sources you edit when programming a pattern.
0x1C19	Please enter a destination now	Edit mode/pattern: When having selected a source in the “Sample Transfer” command you first have to enter a destination for this source before moving to the next source position	▸ Edit the destination position(s) for the selected source position.
0x1C1A	No more positions available (limited by **Number of Samples** command)	Edit mode/pattern: Editing further positions is not possible because the limit set in the Number of Samples command would be exceeded.	▸ Select a pattern that fits the programmed Number of Samples command.
0x1C1B	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1C1C	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.

Code	Symptom/message	Cause	Remedy
0x1C1D	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1C1E	Pattern for reagent transfer: source can be chosen only once	Edit mode/pattern for command Reagent Transfer: After having entered the source and the destinations for the reagent transfer you cannot select an additional source.	▸ Enter the source only once. In case this does not meet your requirements for this application consider selecting command Sample Transfer instead of Reagent Transfer; or: ▸ Call local Eppendorf Application Support.
0x1C1F	Pattern with 8-channel tool: Please edit upper position of this tool	Edit mode/pattern with 8-channel tool: Only the upper positions of the 8-channel tools can be selected.	▸ See explanation in "Cause".
0x1C20	Pattern for sample transfer: only one position per sample on source	Edit mode/pattern for command Sample Transfer: Before selecting a second source position, you have to edit the destination for the first source position.	▸ Enter destination for the source you just selected; afterwards, you can edit the next source position.
0x1C21	In source rack further positions cannot be edited because positions in destination rack are already occupied	Edit mode/pattern: Selecting further source positions would require a second destination rack according to the pattern you edited.	▸ Edit a pattern that does not require more than one destination rack per command. To use more destination racks, create additional commands.
0x1C22	Pattern for pool one dest: destination can be chosen only once	Edit mode/pattern for command PoolOneDest: After having entered the sources and the destination, you cannot select an additional destination.	▸ Enter the destination only once. In case this does not meet your requirements for this application, consider selecting command Pool instead of PoolOneDest; or: ▸ Call local Eppendorf Application Support.
0x1C23	Pattern for dilute: only one position per sample on source	Edit mode/pattern for command Dilute: Before selecting a second source position, you have to edit the destination for the first source position.	▸ Enter destination for the source you just selected; afterwards, you can edit the next source position.
0x1C25	Pattern for pool: only one position per sample on destination	Edit mode/pattern for command Pool: Before selecting a second destination position, you have to edit the next source positions to be pooled into this destination.	▸ Enter sources for the next destination position; afterwards, you can edit the next destination position.
0x1C26	Pattern for Reagent Transfer: not enough source positions	Run mode: To provide enough reagent volume for the number of samples you entered, the selected reagent source positions must be higher.	▸ Start the application again and enter a lower number of samples; or: ▸ Enter the edit mode and program more reagent source positions in the pattern. Keep in mind that the selected reagent source positions may not extend beyond one rack.

Code	Symptom/message	Cause	Remedy
0x201D	(SVC_CALIB_CYC_ANGLE_TOLERANCE) Cycler: angle tolerance is too big.	Axis may have a slight tilt.	▸ Call local Eppendorf Service.
0x2025	Bottom tolerance too big	Bottom tolerance too big.	▸ Use a smaller value.
0x2026	Bottom tolerance too small	Bottom tolerance too small.	▸ Use a bigger value.
0x2027	(SVC_ILLEGAL_NODE_TYPE)	Internal error.	▸ Call local Eppendorf Service.
0x2100	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x2101	Tool not defined.	Parameter Pipet. Tool was not edited in the application.	▸ See explanation in "Cause".
0x2102	Tool not selected in the Labware File Window	The pipette tool you edited in the application is not selected in the Labware File Window and therefore is not available for programming.	This selection could only be deactivate/activated by Eppendorf Service. ▸ Call local Eppendorf Service.
0x2104	Tips not edited in worktable/procedure	Tips were edited in the procedure of the application, but they were not edited in the worktable (e.g., filter tips <-> tips without filter).	▸ Edit the tips that you programmed in the procedure in the worktable.
0x2105	Parameter conflict: Start volume greater than filling volume of source tube or well	The Volume and Source parameters of the source vessel do not match (Volume is higher than the maximum filling volume of the source vessel).	▸ Edit Volume and Source in the worktable so that Volume is covered by the maximum filling volume of the source vessel.
0x2106	Parameter conflict: Start volume greater than filling volume of destination tube or well	The Volume and Destination parameters of the destination vessel do not match (Volume is higher than the maximum filling volume of the destination vessel).	▸ Edit Volume and Destination in the worktable so that Volume is covered by the maximum filling volume of the destination vessel.
0x2107	Volume not defined	Parameter Volume was not edited in the application.	▸ See explanation in "Cause".
0x2108	Parameter conflict: Volume too small for this tool	The Volume and Pipet. Tool parameters of the application do not match (Volume is smaller than the lower limit of the tool volume range).	▸ Edit Volume and Pipet. Tool so that Volume is covered by the volume range of the pipette tool.
0x2109	Parameter conflict: Volume too large for this tool	The Volume and Pipet. Tool parameters of the application do not match (Volume is higher than the upper limit of the tool volume range).	▸ Edit Volume and Pipet. Tool so that Volume is covered by the volume range of the pipette tool.
0x210A	Parameter conflict: volume greater than filling volume of source tube or well	The Volume and Source parameters of the application do not match (Volume is higher than the maximum filling volume of the source vessel).	▸ Edit Volume and Source so that Volume is covered by the maximum filling volume of the source vessel.
0x210B	Parameter conflict: volume greater than filling volume of destination tube or well	The Volume and Destination parameters of the application do not match (Volume is higher than the maximum filling volume of the destination vessel).	▸ Edit Volume and Destination so that Volume is covered by the maximum filling volume of the destination vessel.
0x210D	Source rack not defined	Parameter Source was not edited in the application.	▸ See explanation in "Cause".

Code	Symptom/message	Cause	Remedy
0x210E	Source rack not edited in worktable	The source rack you edited in the procedure of the application has been removed from the worktable.	▸ Edit the rack that you programmed in the procedure as Source in the worktable, or edit a different source rack in the application.
0x210F	Source rack not selected in the Labware File Window	The source rack you edited in the application is not selected or removed in the Labware File Window and therefore is not available for programming.	▸ Select the rack in the Labware File Window or edit a different rack in the application.
0x2110	Destination rack not defined	Parameter Source was not edited in the application.	▸ See explanation in "Cause".
0x2111	Destination rack not edited in worktable	Destination rack was edited in the procedure of the application, but it was not edited in the worktable.	▸ Edit the rack that you programmed in the procedure as Destination in the worktable or edit a different destination rack in the application.
0x2112	Destination rack not selected in the Labware File Window	The destination rack you edited in the application is not selected or removed in the Labware File Window and therefore is not available for programming.	▸ Select the rack in the Labware File Window or edit a different rack in the application.
0x2113	Pattern not defined	Parameter Pattern was not edited in the application.	▸ See explanation in "Cause".
0x2114	Loading error (invalid entry in pattern)	Normally a system error; but may also be caused by editing a pattern without destination positions; or: File damaged.	▸ Edit a pattern with source and destination positions. In other cases: ▸ Call local Eppendorf Service.
0x211B	Liquid type not defined	Parameter Liquid Type was not edited in the application.	▸ Choose a "Liquid Type" for the Liquid Handling Command.
0x211C	Liquid type not selected in the Labware File Window	The Liquid Type you choose in the application is not selected or removed in the Labware File Window and therefore is not available for programming.	This selection could only be deactivate/activated by Eppendorf Service. ▸ Call local Eppendorf Service.
0x211D	Mixing cycles in source not defined	Parameter No. of Cycles in a mix procedure was not edited for the source in the application (mix procedure as defined in a command Mix or as part of a liquid transfer command via parameter Options).	▸ See explanation in "Cause".
0x211E	Invalid entry for mixing cycles in source (1 ... 99)	Entry for the No. of Cycles parameter in a mix procedure for source vessels was higher than the max. limit (1 up to 99 cycles) (mix procedure as defined in a command Mix or as part of a liquid transfer command via parameter Options).	▸ Enter a number between 1 and 99 for the No. of Cycles parameter.
0x211F	Invalid entry for mixing speed in source (1 ... 10)	Entry for the parameter Speed in a mix procedure for source vessels was higher than the max. limit (1 up to 10) (mix procedure as defined in a command Mix or as part of a liquid transfer command via parameter Options).	▸ Enter a number between 1 and 10 for the Speed parameter.
0x2120	Mixing volume in source not defined	Parameter Volume in a mix procedure for source vessels was not edited in the application (mix procedure as defined in a command Mix or as part of a liquid transfer command via parameter Options).	▸ See explanation in "Cause".

Code	Symptom/message	Cause	Remedy
0x2121	Parameter conflict: mixing volume in source too large for this tool	The Volume and Pipet. Tool parameters of a mix procedure for source vessels are not in agreement (Volume is higher than the upper limit of the tool's volume range) (mix procedure as defined in a command Mix or as part of a liquid transfer command via parameter Options).	▸ Edit Volume and Pipet. Tool so that Volume is within pipette tool's volume range.
0x2122	Parameter conflict: mixing volume in source too small for this tool	The Volume and Pipet. Tool parameters of a mix procedure for source vessels do not match (Volume is less than the lower limit of the tool's volume range) (mix procedure as defined in a command Mix or as part of a liquid transfer command via parameter Options).	▸ Edit Volume and Pipet. Tool so that Volume is within the pipette tool's volume range.
0x2123	Parameter conflict: mixing volume in source greater than filling volume of source tube or well	The Volume and Source parameters of a mix procedure in the application do not match (Volume is higher than the maximum filling volume of the source vessel) (mix procedure as defined in a command Mix or as part of a liquid transfer command via parameter Options).	▸ Edit Volume and Source so that Volume is within the allowable filling volume of the source vessel.
0x2124	Mixing cycles in destination not defined	Parameter No. of Cycles in a mix procedure for destination vessels was not edited in the application (mix procedure as part of a liquid transfer command via parameter Options)	▸ See explanation in "Cause".
0x2125	Invalid entry for mixing cycles in destination (1 ... 99)	Entry for the parameter No. of Cycles in a mix procedure for destination vessels was higher than the max. limit (1 up to 99 cycles) (mix procedure as part of a liquid transfer command via parameter Options).	▸ Enter a number between 1 and 99 for the No. of Cycles parameter.
0x2126	Invalid entry for mixing speed in destination (1 ... 10)	Entry for the parameter Speed in a mix procedure for destination vessels was higher than the max. limit (1 up to 10) (mix procedure as part of a liquid transfer command via parameter Options).	▸ Enter a number between 1 and 10 for the Speed parameter.
0x2127	Mixing volume in destination not defined	Parameter Volume in a mix procedure for destination vessels was not edited in the application (mix procedure as part of a liquid transfer command via parameter Options).	▸ See explanation in "Cause".
0x2128	Parameter conflict: mixing volume in destination too large for this tool	The Volume and Pipet. Tool parameters in a mix procedure for destination vessels do not match (Volume is higher than the upper limit of the tool volume range) (mix procedure as part of a liquid transfer command via parameter Options).	▸ Edit Volume and Pipet. Tool so that Volume is within the pipette tool's volume range.
0x2129	Parameter conflict: mixing volume in destination too small for this tool	The Volume and Pipet. Tool in a mix procedure for destination vessels do not match (Volume is lower than the minimum allowed volume) (mix procedure as part of a liquid transfer command via parameter Options).	▸ Edit Volume and Pipet. Tool so that Volume is within the volume range of the pipet tool.
0x212A	Parameter conflict: mixing volume in destination greater than filling volume of destination tube or well	The Volume and Destination parameters in a mix procedure for destination vessels do not match (Volume is higher than the maximum filling volume of the destination vessel) (mix procedure as part of a liquid transfer command via parameter Options).	▸ Edit Volume and Destination so that Volume is within the maximum filling volume of the destination vessel.

Code	Symptom/message	Cause	Remedy
0x212C	Parameter conflict: mix after dispense not allowed in multidispense mode	When the transfer type parameter is set to multidispense, the mix after dispense parameter cannot be edited for this command.	▸ Change parameter transfer type to pipette; or: ▸ Omit the mixing step; in this case you could also edit another mixing step as a new command (Mix), which would be performed after the previous command of the procedure has ended.
0x212D	Parameter conflict: 8-channel tool cannot be used for this source rack	Edit mode / parameter in liquid handling command: Source rack does not fit the 8-channel tool (e.g., 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x212E	Parameter conflict: 8-channel tool cannot be used for this destination rack	Edit mode / parameter in liquid handling command: Destination rack does not fit the 8-channel tool (e.g. 24-well plate or tube rack with 24 positions).	▸ Choose another rack or another tool.
0x212F	Sample number too large	The number of samples you have entered will fill more than one rack (source or destination, respectively) based on the programmed pattern.	▸ Program a pattern that together with the number of samples you want to run will not extend beyond one rack, or choose a lower number of samples in the corresponding Number of Samples command.
0x2130	Parameter conflict: tip cannot be used for this source rack	The Source rack parameter in the liquid handling command does not match the selected tool (e.g., 384-well plate and TS_1000 or TM1000_8).	▸ Choose another rack or another tool.
0x2131	Parameter conflict: tip cannot be used for this destination rack	The Destination rack parameter in the liquid handling command does not match the selected tool (e.g., 384-well plate and TS_1000 or TM1000_8).	▸ Choose another rack or another tool.
0x2132	Invalid number of samples (1 ... 384)	Number of samples you have entered is too high.	▸ Enter a maximum number of samples up to 384.
0x2133	Rack or plate not defined	Edit mode/parameter in command Transport: Labware to be transported was not edited.	▸ See explanation in "Cause".
0x2134	Rack not selected in the Labware File Window	The rack you edited in a command Transport (parameter labware) is not selected or removed in the Labware File Window and therefore is not available for programming.	▸ Select the rack in the Labware File Window or edit a different rack in the application.
0x2135	Location for destination not defined	Edit mode/parameter in command Transport: The destination location for the labware to be transported was not edited.	▸ See explanation in "Cause".
0x2136	Invalid entry for seconds (1 ... 59)	Edit mode/parameter in command Wait: A value beyond the allowed range has been entered for the seconds parameter.	▸ Enter a value between 0 and 59 seconds.
0x2137	Invalid entry for minutes (1 ... 99)	Edit mode/parameter in command Wait: A value above the allowable maximum minutes has been entered for the minutes parameter.	▸ Enter a value between 0 and 99 minutes.
0x2138	Method without active commands	application contains only passive commands (like wait, comment, etc.).	▸ Insert at least one active command.

Code	Symptom/message	Cause	Remedy
0x2139	Parameter conflict: mix before aspirating not allowed in multiaspirate mode	Pool/POD: Mix before aspirating not allowed in multiaspirate mode.	▸ Do not mix.
0x213A	Labware to be exchanged are identical	Parameter in command Exchange: Both values point to the same labware.	▸ Enter a new labware for one of the two positions.
0x2150	Editing vacuum command not possible because vacuum unit is not part of this instrument	Vacuum unit is not listed in the configuration file.	▸ Call local Eppendorf Service.
0x2152	Editing vac lid option in vacuum command not possible because no vac lid on the worktable	To use the Vac Lid option in the vacuum command the worktable must be equipped with a vac lid.	▸ Editing the worktable please place a Vac Lid on position "GRIPPER".
0x2153	Editing vac lid option vacuum command not possible because no gripper on the worktable	To use the Vac Lid option in the vacuum command the worktable must be equipped with a gripper. Communication between instrument and control panel may be defective.	▸ Call local Eppendorf Service.
0x2154	Parameter conflict: Check levels time may not be shorter than remove lid time	The check levels option can only be performed when the lid has been taken off the filter plate before by the gripper.	▸ Select a check levels time greater than the remove lid time.
0x2160	No temperature unit in the selected location	Editing a temperature command you must select a location equipped with a temperature unit.	▸ See explanations in "Cause".
0x2161	Temperature unit 1 is not installed	Temperature unit 1 is not listed in the configuration file.	▸ Call local Eppendorf Service.
0x2162	Temperature unit 2 is not installed	Temperature unit 2 is not listed in the configuration file.	▸ Call local Eppendorf Service.
0x2163	Temperature unit 3 is not installed	Temperature unit 3 is not listed in the configuration file.	▸ Call local Eppendorf Service.
0x2170	Parameter conflict: Parameter elution from filter is only possible when filter plates have been selected as source	To edit the elution from filter option a filter plate must have been edited as source.	▸ See explanations in "Cause".
0x2171	Parameter conflict: Multidispense mode is not allowed when selected elution from filter	See explanation in the error message.	▸ See explanation in the error message.
0x2172	Parameter conflict: Transfer volume must be set to zero when Parameter elution from filter has been selected	Using the elution from filter option, the complete volume contained in the filter plate wells is always aspirated; therefore, editing a volume to be transferred is not possible.	▸ Set the volume to zero because the entry will not have an effect in the application run.
0x2173	Elution from filter is only possible in a sample transfer	File damaged.	▸ Call local Eppendorf Service.
0x2180	Cycler is not installed	Cycler unit is not listed in the configuration file.	▸ Call local Eppendorf Service.
0x2181	Name of cycler method is not edited	Using the cycler command the name of the cycler application to be used must be edited in the epMotion command.	▸ See explanation in "Cause".

Code	Symptom/message	Cause	Remedy
0x2182	Cycler method is not available	The cycler application selected in the epMotion command `cycler` is not available.	▸ Select a different cycler application. If the application should be available but is not recognized by the software: ▸ Call local Eppendorf Service.
0x2183	Cycler command is not last command in method	The `cycler` command must always be the last command of a epMotion application.	▸ Do not add other commands after a `cycler` command. To run other procedures after or during the cycler run start a different application.
0x2190	Transport command not possible because no workstation available	The chosen application may not be run on the selected device. Possible cause for this error message: The application has been written for another device.	▸ Load the concerned application on an other device, or ▸ delete Transport commands in the application.
0x2191	Exchange command not possible because no liquid handling station available	The chosen application may not be run on the selected device. Possible cause for this error message: The application has been written for another device.	▸ Load the concerned application on an other device, or ▸ delete Exchange commands in the application.
0x2201	Hardware error Carrier: final position in x always found	X-axis motor: Home switch always on.	▸ Call local Eppendorf Service.
0x2207	Hardware error Carrier: steps lost in x	X-axis motor: Steps lost.	▸ Call local Eppendorf Service.
0x220A	(SMOT_IOCTL_ERR)	X-axis motor: Unknown driver error code.	▸ Call local Eppendorf Service.
0x220B	(SMOT_BADPARAMS)	X-axis motor: error bad parameters.	▸ Call local Eppendorf Service.
0x220C	(SMOT_ALREADYONPOS)	X-axis motor: already in position.	▸ Call local Eppendorf Service.
0x2301	Hardware error Carrier: final position in y always found	Y-axis motor: Home switch always on.	▸ Call local Eppendorf Service.
0x2307	Hardware error Carrier: steps lost in y	Y-axis motor: Steps lost.	▸ Call local Eppendorf Service.
0x230D	Hardware error Carrier: steps lost in y	Y-axis motor: Steps lost.	▸ Call local Eppendorf Service.
0x230E	Hardware error Carrier: final position in y not found	Y-axis motor: Home not found.	▸ Call local Eppendorf Service.
0x230F	Hardware error Carrier: final position in y not found	Y-axis motor: Home not found.	▸ Call local Eppendorf Service.
0x2401	Hardware error Carrier: final position in z always found	Z-axis motor: Home switch always on.	▸ Call local Eppendorf Service.
0x2402	Hardware error Carrier: final position 2 in z not found	Z-axis motor: Home2 not found.	▸ Call local Eppendorf Service.

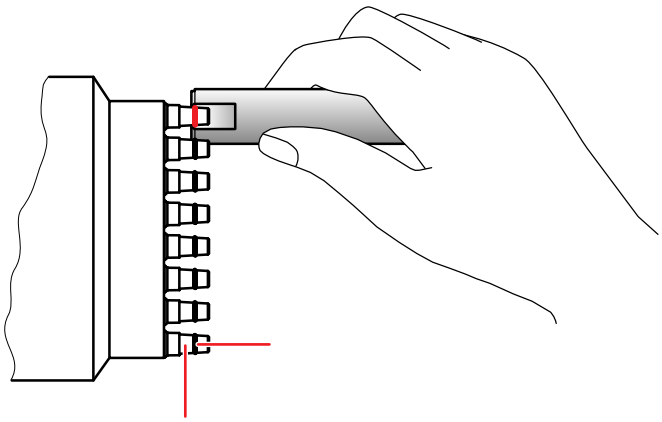
Code	Symptom/message	Cause	Remedy
0x2403	Hardware error Carrier: final position 2 in z always found	Z-axis motor: Home2 switch always on.	▸ Call local Eppendorf Service.
0x2404	Hardware error Carrier: final position in z wrong	Z-axis motor: Wrong home switch.	▸ Call local Eppendorf Service.
0x2407	Hardware error Carrier: steps lost in z	Z-axis motor: Steps lost.	▸ Call local Eppendorf Service.
0x240D	Hardware error Carrier: steps lost in z	Z-axis motor: Steps lost.	▸ Call local Eppendorf Service.
0x240E	Hardware error Carrier: final position in z not found	Z-axis motor: Home not found.	▸ Call local Eppendorf Service.
0x240F	Hardware error Carrier: final position in z not found	Z-axis motor: Home not found.	▸ Call local Eppendorf Service.
0x2F00	Communication error during transmission to Trinamic module	Hardware error The communication with the Trinamic module is failing.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x2F01	Communication error during reception from Trinamic module	Hardware error The communication with the Trinamic module is failing.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x2F02	Checksum error during reception from Trinamic module	Hardware error The checksum from the Trinamic module is failing.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x2F03	Communication error during reception from Trinamic module	Hardware error The communication with the Trinamic module is failing.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x2F06	Mixer motor cannot find its home position	Hardware error Mixer motor cannot find its home position	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x2F08	Clamping device cannot write to spi bus	Hardware error Communication with clamping device is failing.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x2F0A	Clamping device did not reach operating current	Hardware error The gear belt of the clamping device may be failing.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x2F0C	Clamping device limit switch has wrong position	Hardware error	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x3000	Temperature unit 1 in location C1 reports an invalid temperature	The temperature unit "TEMP1" in position C1 is damaged and showed an invalid temperature.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service

Code	Symptom/message	Cause	Remedy
0x3001	Temperature unit 2 in location C2 reports an invalid temperature	The temperature unit "TEMP2" in position C2 is damaged and showed an invalid temperature.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x3002	Temperature unit 3 in location C3 reports an invalid temperature	The temperature unit "TEMP3" in position C3 is damaged and showed an invalid temperature.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x3003	The thermomixer reports an invalid temperature	The temperature unit of the thermomixer is damaged and showed an invalid temperature.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x3004	Temperature unit 1 in location C1 cannot heat	The temperature unit "TEMP1" in position C1 is damaged and do not heat.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x3005	Temperature unit 2 in location C2 cannot heat	The temperature unit "TEMP2" in position C2 is damaged and do not heat.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x3006	Temperature unit 3 in location C3 cannot heat	The temperature unit "TEMP3" in position C3 is damaged and do not heat.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x3007	The thermomixer cannot heat	The temperature unit of the thermomixer is damaged and do not heat.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x3008	Temperature unit 1 in location C1 cannot cool	The temperature unit "TEMP1" in position C1 is damaged and does not cool.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x3009	Temperature unit 2 in location C2 cannot cool	The temperature unit "TEMP2" in position C2 is damaged and does not cool.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x300A	Temperature unit 3 in location C3 cannot cool	The temperature unit "TEMP3" in position C3 is damaged and does not cool.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service
0x300B	The thermomixer cannot cool	The temperature unit of the thermomixer is damaged and does not cool.	Shut down and switch off the instrument; if error re-occurs after switching on: Call Eppendorf Service

8 Maintenance

8.1 Service

8.1.1 Replacing the sealing rings of the eight-channel dispensing tool



1 Sealing ring	2 Tip cone

NOTICE!

Damage to the gold contacts from handling.

The connection to the PCB of the dispensing tool is interfered with or interrupted if the gold contacts on the dispensing tool are damaged or dirtied.

- Do not touch the gold contacts.

Replace the sealing rings annually or as required.

Use the auxiliary tool and the mounting aid included with the delivery of the dispensing tool.

Carry out the following steps to replace the sealing rings:

1. Attach the edge of the auxiliary tool at the level of the sealing ring.
2. Cut the sealing ring at the dispensing tool with the help of the auxiliary tool.
3. Remove the sealing ring by hand.
4. Clean the tip cones with a lightly moist and lint-free cloth.
5. Repeat the process for all other sealing rings and tip cones.
6. Attach the new sealing rings with the help of the mounting tool (shortened pipette tip) and position the sealing rings in the recessed grooves of the tip cones.

8.1.2 Replacing the seals of the vacuum unit

- Replace the seals if there is visible damage or every half a year (or after 300 method executions).

8.1.3 Replace the sealing mat of the Vac Lid

1. Button the new silicone sealing mat onto the bolts on the underside of the Vac Lid.
2. Ensure that the bolt heads do not get stuck in the mat.

8.1.4 Maintaining the dispensing tools

NOTICE!

A lack of servicing will impair reliable dispensing.

Servicing of the dispensing tools is essential after 200,000 full strokes. This is the only way to ensure reliable dispensing.

- Note the warning in the software reporting that 200,000 full strokes have been reached and have the dispensing tools serviced.

- Send the dispensing tool for maintenance to your service partner of Eppendorf AG.

8.1.5 Maintaining the gripper

- You can have the pins in the gripper jawas replaced by your service partner of Eppendorf AG.

8.2 Cleaning

8.2.1 Cleaning the worktable

NOTICE!

Damage from UV radiation.

UV radiation can cause color changes to the surface or, in the course of time, cause damage to the moving parts and electronics of the epMotion.

- Avoid UV radiation.

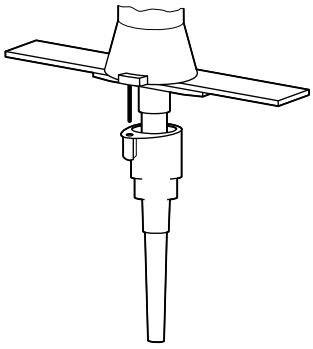
If the worktable becomes contaminated during operation, remove such contamination as quickly as possible.

1. Clean the worktable with a 70% ethanol solution or with hypochlorite-containing agents (3%) and a lint-free cloth.
2. Clean the worktable in the area of the spring plate using a cotton bud if necessary.

8.2.2 Cleaning the worktable base adapter

1. Clean the worktable base adapter with alcohol-containing disinfectants and a lint-free cloth. Do not use any cleaning agents which contain sodium hypochlorite.
2. Wipe off the disinfectants after they have had time to take effect.

8.2.3 Cleaning the dispensing tools



1. Remove the ejector of the single-channel tools.
2. Clean the tip cones and surfaces with water or a 70% ethanol solution or with hypochlorite-containing (3%) agents and a lint-free cloth.
3. Wipe off the disinfectants after they have had time to take effect.

8.2.4 Cleaning the gripper

CAUTION!

Risk of injury from sharp pins.

Cuts or other injuries to the skin from sharp pins on the insides of the gripper jaws.

- Always grasp the gripper at the top and not inside at the gripper jaws.

1. Clean the gripper with water, alcohol or alcohol-containing disinfectants or with Na hypochlorite-containing (3 to 4%) agents and a lint-free cloth.
2. Wipe off the disinfectants after they have had time to take effect.

8.2.5 Cleaning the vacuum unit

1. In the event of contamination, clean the vacuum unit immediately with alcohol-containing disinfectants or with Na hypochlorite-containing (3 to 4%) agents and a lint-free cloth.
2. Wipe off the disinfectants after they have had time to take effect.

8.2.6 Cleaning the thermomixer

1. In the event of contamination, clean the vacuum unit immediately with alcohol-containing disinfectants or with Na hypochlorite-containing (3 to 4%) agents and a lint-free cloth.
2. Wipe off the disinfectants after they have had time to take effect.

8.2.7 Cleaning the thermoadapter, thermoblock and thermorack

1. Wipe down thermoadapter, thermoblock and thermorack with alcohol-containing disinfectant or with Na hypochlorite (3 to 4%) and a lint-free cloth.
2. Wipe off the disinfectants after they have had time to take effect.

8.2.8 Cleaning the Vac Lid / Vac Thermo Lid

1. Clean Vac Lid mats and Vac Lid with alcohol-containing disinfectants or with Na hypochlorite solution (5%) and a lint-free cloth.
2. Leave the disinfectants to act in accordance with the time specified in the instructions.
3. Wipe off the disinfectants.

8.2.9 Autoclave hardware and labware

8.2.9.1 Gripper and dispenser tool

NOTICE!

Damage from excessive temperatures or contact with the wall of the autoclave.

- Ensure that the temperature in the autoclaving range exceeds 121 °C by no more than 5 °C.
- Ensure that the dispensing tool/gripper is not in contact with the wall of the autoclave.

Autoclave the dispensing tools and gripper in their entirety even though they include an electronic component.

- Autoclave the gripper/dispensing tools for 20 minutes at 121 °C and 1 bar pressure.

8.2.9.2 Autoclaving the vacuum unit

- Autoclave all transportable parts of the vacuum unit for 20 minutes at 121 °C and 1 bar pressure.

8.2.9.3 Autoclaving Labware

You can autoclave the following labware.

- Thermoadapter, thermoblock and thermorack
- Vac Lid mats, Vac Lid and Vac Thermo Lid
- Elastic rubber mats and CycleLock frame
- Tip Holder for epT.I.P.S. Motion Reloads.

▸ Autoclave the labware for 20 minutes at 121 °C and 1 bar pressure.

The CycleLock mats and frame can also each be irradiated with UV and decontaminated 20 times.

1. Irradiate the mats and the frame at 254 nm UV.
2. Decontaminate in Na hypochlorite solution (10%) for 10 minutes.

8.3 Decontamination before shipment

If you want to send the dispensing tool or gripper to be checked, repaired or calibrated by Eppendorf AG or one of its service partners, please observe the following:

WARNING!

Health hazard from contaminated dispensing tools and gripper.

▸ Perform decontamination before returning or storing the dispensing tools and the gripper. The dispensing tools and the gripper must be clean and free of hazardous substances.

Hazardous substances are:

- solutions presenting a hazard to health
- potentially infectious agents
- organic solvents and reagents
- radioactive substances
- proteins presenting a hazard to health
- DNA

▸ Follow the instructions in the decontamination certificate. These can be found as a PDF file on our homepage www.eppendorf.de.

▸ Decontaminate all the parts you want to dispatch.

▸ Include the completed and signed decontamination certificate for returned goods with your shipment (incl. the serial number of the dispensing tool).

9 Technical data

The following technical data apply exclusively to the automatic pipetting system epMotion. For technical data on the PC and the keyboard please refer to the appropriate operating instructions.

9.1 Power supply

Voltage Fuses Current consumption	100 to 240 V ±10% T 10 AL / 250 V < 10 A
Frequency	50 Hz to 60 Hz ±5%
Power consumption (excluding thermal module) • epMotion 5075 LH • epMotion 5075 VAC • epMotion 5075 MC • epMotion 5075 TMX	• 80 W • 140 W • 880 W • 185 W
Power consumption for thermal module	60 W
Overvoltage category	II (IEC 610 10-1)
Degree of contamination:	2
Protection class	1

9.2 Ambient conditions

General operation	+15°C to +35°C 55% to 75% rel. humidity up to 2000 m NN
Storage conditions	-20°C to +70°C 10% to 80% rel. humidity

9.3 Weight/dimensions

Device	
Width	107 cm
Depth	61 cm
Height	67 cm

Weight	
Automatic pipetting system epMotion LH	85 kg
Automatic pipetting system epMotion VAC	90 kg
Automatic pipetting system epMotion MC	102 kg
Automatic pipetting system epMotion TMX	116 kg

9.4 Interfaces

Interface	**Specification**
USB	USB 2.0
Ethernet	Ethernet 100 MBit/s

9.5 Dispensing Tools

Data for free-jet pipetting using double-distilled water. Data analysis in accordance with ISO 8655.

Temperature approx. 20 °C, standard air pressure.

9.5.1 Pipetting

Dispensing tool	Volume range	Volume	Error		Limits for average values	
			systematic (falsity)	random (Imprecision)	Lower limit	Upper limit
TS 50	1.0 - 50 µL	1 µL	±20.0 %	±5.0 %	0.80 µL	1.20 µL
		5 µL	±5.0 %	±3.0 %	4.75 µL	5.25 µL
		25 µL	±1.5 %	±0.6 %	24.63 µL	25.38 µL
		50 µL	±1.0 %	±0.4 %	49.50 µL	50.50 µL
TS 300	20 - 300 µL	20 µL	±4.0 %	±2.5 %	19.2 µL	20.8 µL
		30 µL	±3.0 %	±1.5 %	29.1 µL	30.9 µL
		150 µL	±1.0 %	±0.4 %	148.5 µL	151.5 µL
		300 µL	±0.6 %	±0.3 %	298.2 µL	301.8 µL
TS 1000	40 - 1 000 µL	40 µL	±5.0 %	±1.5 %	38.0 µL	42.0 µL
		100 µL	±2.0 %	±1.0 %	98.0 µL	102.0 µL
		500 µL	±1.0 %	±0.2 %	495.0 µL	505.0 µL
		1 000 µL	±0.7 %	±0.15 %	993.0 µL	1007.0 µL
TM 50_8	1.0 - 50 µL	1 µL	±25.0 %	±10.0 %	0.75 µL	1.25 µL
		5 µL	±5.0 %	±5.0 %	4.75 µL	5.25 µL
		25 µL	±2.0 %	±1.2 %	24.50 µL	25.50 µL
		50 µL	±1.2 %	±0.6 %	49.40 µL	50.60 µL
TM 300_8	20 - 300 µL	20 µL	±10.0 %	±4.0 %	18.0 µL	22.0 µL
		30 µL	±10.0 %	±3.5 %	27.0 µL	33.0 µL
		150 µL	±2.5 %	±0.8 %	146.3 µL	153.8 µL
		300 µL	±1.5 %	±0.5 %	295.5 µL	304.5 µL
TM 1000_8	40 - 1 000 µL	40 µL	±6.0 %	±2.5 %	37.6 µL	42.4 µL
		100 µL	±3.0 %	±1.5 %	97.0 µL	103.0 µL
		500 µL	±1.5 %	±0.3 %	492.5 µL	507.5 µL
		1 000 µL	±0.8 %	±0.15 %	992.0 µL	1008.0 µL

9.5.2 Dispensing

Dispensing tool	Volume range	Volume	Error		Limits for average values	
			systematic (falsity)	random (Imprecision)	Lower limit	Upper limit
TS 50	1.0 - 50 µL	1 µL 5 µL 25 µL 50 µL	±5.0 %	±12.0 %	4.8 µL	5.3 µL
TS 300	20 - 300 µL	20 µL 30 µL 150 µL 300 µL	±3.0 %	±5.0 %	29.1 µL	30.9 µL
TS 1000	40 - 1 000 µL	40 µL 100 µL 500 µL 1 000 µL	±2.0 %	±2.0 %	98.0 µL	102.0 µL
TM 50_8	1.0 - 50 µL	1 µL 5 µL 25 µL 50 µL	±7.5 %	±15.0 %	4.6 µL	5.4 µL
TM 300_8	20 - 300 µL	20 µL 30 µL 150 µL 300 µL	±5.5 %	±15.0 %	28.4 µL	31.7 µL
TM 1000_8	40 - 1 000 µL	40 µL 100 µL 500 µL 1 000 µL	±1.0 %	±6.0 %	99.0 µL	101.0 µL

When dispensing the defined errors for pipetting are exceeded.

9.6 Further specifications

9.6.1 Noise level

Noise level	typically 56 dB (A)

9.6.2 Optical sensor

Optical confocal infrared sensor	Non-contact detection of liquid levels, tools used, labware surfaces, types and quantities of tips
Detection conditions	The liquid surface must be at 90 ± 3° in relation to the optical beam axis. The liquid height must be at least 3 mm

9.6.3 Carrier

X-Y-Z axis positioning	
Systematic error	±0.3 mm
Random error	±0.1 mm

9.6.4 Gripper

Form-fit carrying capacity	≤1200 g
Force-fit carrying capacity	≤2000 g

9.6.5 Vacuum unit

Max. pumping quantity	35 NL/min
Vacuum range	0.1 to 85 kPa
Time which can be selected	1 sec to 35 min 59 sec

9.6.6 Thermomixer

Power consumption	105 W
RPM	300 min^{-1} to 2 000 $^{-1}$
Mixing period	1 min to 120 min
Load	max. 1 000 g
Incubation	4 °C to 95 °C max. temperature difference: 15 °C below ambient temperature

9.6.7 Thermal module

Setting range	0 to 110 °C
Systematic measuring deviation at: • 4 °C • 37 °C • 95 °C	 • ±2 °C • ±1 °C • ±2 °C
Random measuring deviation	±1 °C
Power consumption	60 W

9.6.8 Vac Thermo lid

Max. block temperature	110 °C
Max. housing temperature	55 °C
Weight	1.3 kg
Height	60 mm
Length/width	MTP format

9.6.9 Rack LC for LightCycler capillaries

Capacity	96 Roche LightCycler capillaries (20 or 100 µL)
Weight	290 g (210 g rack + 80 g filled capillaries 100 µL)
Height	• 36 mm = Rack LC • 51 mm = Rack LC + capillaries (20 µL) with seal • 57 mm = Rack LC + capillaries (100 µL) with seal
Max. speed:	700 x g centrifugation speed

10 Ordering Information

10.1 Accessories

Use only original Eppendorf accessories or accessories (labware) approved by Eppendorf AG on the epMotion.

10.1.1 Automated pipetting system epMotion 5075

Order No. (International)	Order No. (North America)	Description
5075 000.750	960020101	**Automated pipetting system epMotion 5075 LH with integrated PC** as 5075 000.008 plus integrated industrial PC, keyboard and mouse
5075 000.768	960020202	**Automated pipetting system epMotion 5075 VAC with integrated PC** as 5075 000.016 plus integrated industrial PC, keyboard and mouse
5075 000.776	960020303	**Automated pipetting system epMotion 5075 MC with integrated PC** as 5075 000.032 plus integrated industrial PC, keyboard and mouse
5075 000.784	960020404	**Automated pipetting system epMotion 5075 TMX with integrated PC** as 5075 000.733 plus integrated industrial PC, keyboard and mouse

10.1.2 Dispensing Tools

Order No. (International)	Order No. (North America)	Description
5280 000.010	960001010	**Single-channel dispensing tool TS 50** Volume range 1 - 50 µl
5280 000.037	960001028	**Single-channel dispensing tool TS 300** Volume range 20 - 300 µl
5280 000.053	960001036	**Single-channel dispensing tool TS 1 000** Volume range 40 - 1 000 µL
5280 000.215	960001044	**Eight-channel-dispensing tool TM 50-8** Volume range 1 - 50 µL
5280 000.231	960001052	**Eight-channel-dispensing tool TM 300-8** Volume range 20 - 300 µL
5280 000.258	960001061	**Eight-channel-dispensing tool TM 1 000-8** Volume range 40 - 1 000 µL
5075 774.003	960001109	**Holder for 6 dispensing tools**

10.1.3 Gripper

Order No. (International)	Order No. (North America)	Description
5282 000.018	960002270	**Gripper**
5075 759.004	960002211	**Gripper holder**

10.1.4 Thermal module

Order No. (International)	Order No. (North America)	Description
5075 757.001	960002181	**Tempering unit** for heating and cooling microplates and thermal racks

10.1.5 Accessories for nucleic acid purification

Order No. (International)	Order No. (North America)	Description
5075 778.009	960002237	**Vac frame holder**
5075 779.005	960002245	**VAC lid**
5075 784.009	960002253	**VAC frame 1**
5075 785.005	960002261	**VAC frame 2**
5075 793.008	960002407	**Mat for vacuum lid**
5075 785.030	960002531	**Collection plate adapter** for handling collection microtubes in microtube racks
5075 794.004	960002540	**Channeling Plate** for vacuum processing foaming solutions through multiwell plates, set of 10
5075 796.007	960002551	**Vac Thermo Lid**

10.1.6 Mastercycler ep

Order No. (International)	Order No. (North America)	Description
5341 000.108 5341 000.124	- 950010029	**Mastercycler ep gradient** with motorized lid 230 V / 50 - 60 Hz 115 V / 50 - 60 Hz
5345 000.102 5345 000.129	- 950010045	**Mastercycler ep gradient S** with motorized lid 230 V / 50 - 60 Hz 115 V / 50 - 60 Hz
5344 000.109 5344 000.125	- 950010061	**Mastercycler ep 384** with motorized lid 230 V / 50 - 60 Hz 115 V / 50 - 60 Hz

10.1.7 epT.I.P.S. Motion pipette tips.

Order No. (International)	Order No. (North America)	Description
0030 014.405 0030 014.448 0030 014.480		**epT.I.P.S. Motion** Eppendorf Quality, 10 racks of 96 tips 50 µL 300 µL 1 000 µL
0030 014.413 0030 014.456 0030 014.499		**epT.I.P.S. Motion Filter** PCR clean, 10 racks of 96 tips 50 µL 300 µL 1 000 µL
0030 015.207 0030 015.223 0030 015.240		**epT.I.P.S. Motion** Sterile, 10 racks of 96 tips 50 µL 300 µL 1 000 µL
0030 015.215 0030 015.231 0030 015.258		**epT.I.P.S. Motion Filter** PCR clean and sterile, 10 racks of 96 tips 50 µL 300 µL 1 000 µL
0030 014.421 0030 014.464 0030 014.502		**epT.I.P.S. Motion Reloads** Eppendorf Quality, 12 x 2 trays of 96 tips 50 µL 300 µL 1 000 µL
0030 014.430 0030 014.472 0030 014.510		**epT.I.P.S. Motion Filter Reloads** PCR clean, 12 x 2 trays of 96 tips 50 µL 300 µL 1 000 µL
5075 751.399		**Tip Holder** For epT.I.P.S. Motion Reloads

10.1.8 Reagent reservoirs

Order No. (International)	Order No. (North America)	Description
5075 754.002	960002148	**Reservoir Rack** For use with 30 mL and 100 mL reagent reservoirs
0030 126.505 0030 126.513	960051009 960051017	**epMotion Reservoir** PCR clean, 10 x 5 pieces in bags 30 mL 100 mL
5075 751.364	5075751364	**Reservoir 400 mL** 10 pieces

10.1.9 Racks for individual tubes

Order No. (International)	Order No. (North America)	Description
		Rack
		for 24 Eppendorf Tubes, glass or plastic tubes, no temperature control
5075 761.009	960002024	Ø 17 mm x 100 mm max. length
5075 775.000	960002156	Ø 17 mm x 60 mm max. length
5075 760.002	960002032	Ø 16 mm x 100 mm max. length
5075 776.006	960002164	Ø 16 mm x 60 mm max. length
5075 792.028	960002377	Ø 15 mm x 100 mm max. length
5075 792.044	960002326	Ø 15 mm x 60 mm max. length
5075 792.001	960002369	Ø 14 mm x 100 mm max. length
5075 792.060	960002334	Ø 14 mm x 60 mm max. length
5075 762.005	960002041	Ø 13 mm x 100 mm max. length
5075 792.087	960002342	Ø 13 mm x 60 mm max. length
5075 763.001	960002059	Ø 12 mm x 100 mm max. length
5075 792.109	960002351	Ø 12 mm x 60 mm max. length
		Rack
		for 24 HPLC tubes
5075 792.125	960002380	Ø 12 mm x 40 mm max. length
		Rack
5075 791.005	960002318	for 96x 1.5/2.0 mL screw cap tubes
5075 751.160	960002070	**Thermorack TMX 24xSafeLock 0.5 mL tubes**
5075 751.186	960002080	**Thermorack TMX 24xSafeLock 1.5/2.0 mL tubes**

10.1.10 Modular rack components

Order No. (International)	Order No. (North America)	Description
		RR Module TC
5075 799.049	960002601	PCR 0.2 mL
5075 799.065	960002611	PCR 0.5 mL
5075 799.081	960002620	Safe Lock
5075 799.103	960002630	Ø 12 mm
5075 799.120	960002640	Ø 16 mm
5075 799.162	960002650	Ø 17 mm
5075 799.189	960002660	Ø 29 mm
5075 799.146	960002670	Reservoir 30 mL
5075 799.260	960002680	Reservoir 100 mL

10.1.11 Height Adapter

Order No. (International)	Order No. (North America)	Description
		Height adapter
5075 751.003	960002105	85 mm
5075 752.000	960002113	55 mm
		Height adapter
		for pipette tips
5075 755.009	960002121	40 mm

10.1.12 Additional Accessories

Order No. (International)	Order No. (North America)	Description
5075 001.250	960021044	**Monitor** 19" TFT monitor to be used with epMotion versions with integrated PC
5075 016.001	960000309	**epBlue-epMotion PC Software** Software for epMotion Version with integrated PC, preinstalled
5075 002.000	5075002000	**epBlue ID upgrade kit for epMotion with integrated PC** With epBlue ID installation CD-ROM, recovery DVD, barcode reader, USB hardware Key ("eLicenser") and hardware key code card for upgrading an epBlue or epBlue GxP system
5075 753.006	960002016	**Waste container**
5070 752.001	5070752001	**Worktable base adapter** To raise the epMotion worktable 4 feet
5075 751.054	960002391	**Thermoadapter for Deep Well Plates, 96 wells**
5075 769.000	960002067	**Thermorack for 24 Safe Lock tubes** temperature control 0.5 mL
5075 771.004	960002075	**Rack for 24 Safe Lock tubes** temperature control 1.5/2.0 mL
5075 772.000	960002172	**Adapter** for 25 Safe Lock tubes 0.5 mL

10.1.13 Expansion/upgrade kits

All the expansions and upgrades listed here must only be carried out by service personnel who have been specifically authorized by Eppendorf.

Order No. (International)	Order No. (North America)	Description
5075 000.601	960021002	**Conversion kit LH to MC** for retrofitting an LH version into an MC version
5075 000.610	960021011	**Conversion kit LH to VAC** for retrofitting an LH version into a VAC version
5075 000.628	960021066	**Conversion kit LH to TMX** for retrofitting an LH version into a TMX version
5075 851.440	960021022	**Software and Hardware Upgrade Set 1** Upgrade kit for epMotion 5075 with serial numbers < 1,000
5075 851.520	960021033	**Upgrade kit** for retrofitting a Control Panel version into an PC version
5075 000.830	5075000830	**Software and Hardware Upgrade Set epBlue ID** For epMotion PC to support barcode based documentation Incl. barcode reader with barcode reader stand

10.1.14 Accessories for real-time PCR

Order No. (International)	Order No. (North America)	Description
5075 790.009	960002520	**Rack Smart**
5075 795.000	960002511	**Rack LC 20/100 µL**
5075 751.305	5075751305	**Thermoadapter LC Sample** For MagNA Pure LC sample cartridge
5075 767.031	960002500	**Thermorack CB** 100 µL
5075 787.008	960002199	**Thermoadapter** for PCR 96 wells, skirted
5075 788.004	960002202	**Thermoadapter** for PCR 384 wells, skirted
5075 789.000	960002300	**Thermoadapter FROSTY**
5075 766.000	960002083	**Thermoblock for PCR 96 wells**
5075 767.007	960002091	**Thermoblock for PCR 384 wells**
0030 126.530	960002288	**CycleLock Starter Set** PCR clean, 1 frame and 8 mats for automatical locking of Eppendorf PCR plates
0030 126.548	960002296	**CycleLock mats** PCR clean, 5 pieces
0030 128.648 0030 128.672	951020401 951020460	**twin.tec PCR Plate 96** Wells colorless skirted, colorless, 25 pcs. skirted, blue, 25 pcs.
0030 128.656 0030 128.664 0030 128.680	951020427 951020443 951020486	**twin.tec PCR Plate 96, skirted** Wells colorless, 25 pcs. yellow green red
0030 128.800	951020508	**twin.tec PCR Plate 96, skirted** Wells black, 25 pcs. yellow
0030 128.508 0030 128.532	951020702 951020737	**twin.tec PCR Plate 384** Wells colorless colorless, 25 pcs. blue, 25 pcs.
0030 128.516 0030 128.524 0030 128.540	951020711 951020729 951020745	**twin.tec PCR Plate 384** Wells colorless, 25 pcs. yellow green red
3881 000.015 3881 000.023 3881 000.031	022510509 022510541 022510525	**PCR-Cooler** Starter Set (1 x pink, 1 x blue) Pink Blue

All twin.tec plates can be obtained with barcoding on request.

11 Transport, storage and disposal

11.1 Shut down

If you decommission the epMotion for a prolonged period of time, observe the storage conditions (see *Ambient conditions on p. 172)*.

Carry out the following tasks before decommissioning the epMotion:

1. Clean the epMotion and decontaminate the components (see *Cleaning on p. 169)*.
2. Only have the transport of the epMotion carried out by the service department of Eppendorf AG or authorized service personnel.

11.2 Installation after transport

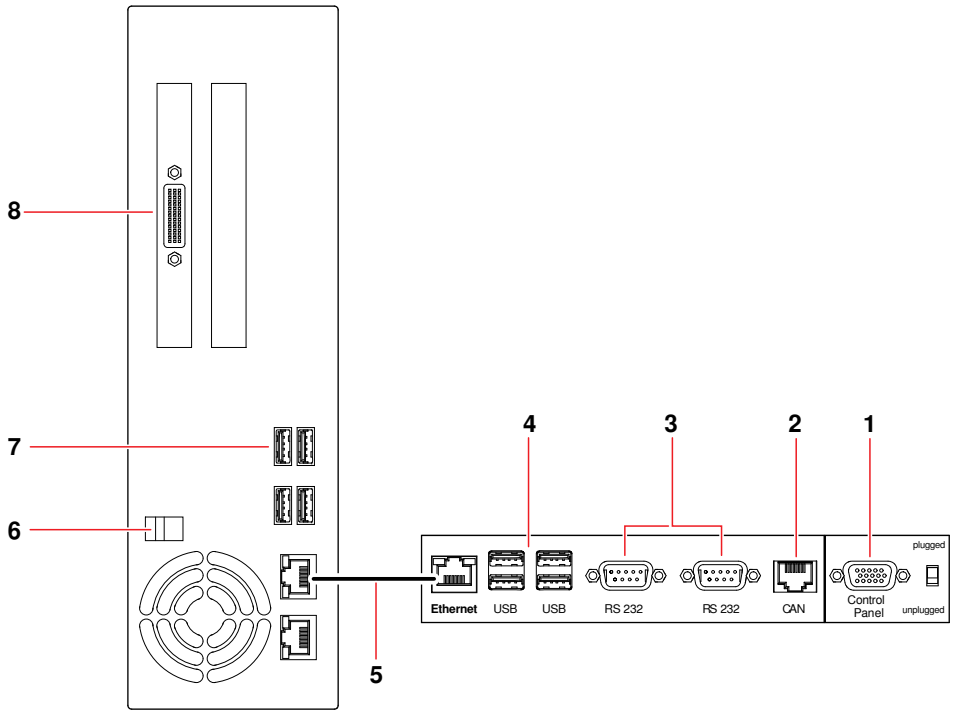


Fig. 1: System connections between epMotion PC and epMotion

1 **Control panel**	2 **CAN** For additional epMotion systems
3 **RS 232**	4 **USB**
5 **Ethernet** Connection between epMotion PC and epMotion	6 **PC power switch**
7 **USB** Connection for mouse and keyboard	8 **DVI monitor connection** DVI connection for PC display

11.3 Disposal

In case the product is to be disposed of, the relevant legal regulations are to be observed.

Information on the disposal of electrical and electronic devices in the European Community:

Within the European Community, the disposal of electrical devices is regulated by national regulations based on EU Directive 2002/96/EC pertaining to waste electrical and electronic equipment (WEEE).

According to these regulations, any devices supplied after August 13, 2005, in the business-to-business sphere, to which this product is assigned, may no longer be disposed of in municipal or domestic waste. To document this, they have been marked with the following identification:

Because disposal regulations may differ from one country to another within the EU, please contact your supplier if necessary.

In Germany, this is mandatory from March 23, 2006. From this date, the manufacturer has to offer a suitable method of return for all devices supplied after August 13, 2005. For all devices supplied before August 13, 2005, the last user is responsible for the correct disposal.

12 Appendix A: Hardware

12.1 Labware

12.1.1 Introduction

Among other features, the software contains a large number of predefined consumables (tubes, pipette tips, plates etc.), racks, holders and tools etc. You will find all labware names arranged in specific subdirectories by labware type. These are explained in the following sections.

This is not a comprehensive description, as the range of labware is constantly being expanded. More information on available labware components can be found in the product description of this operating manual as well in the Internet at www.epMotion.com. **All information subject to change.**

Information about the bottom tolerance and the remaining volume can be displayed via Open labware (Home - create/edit labware tab) in the Labware Properties section.

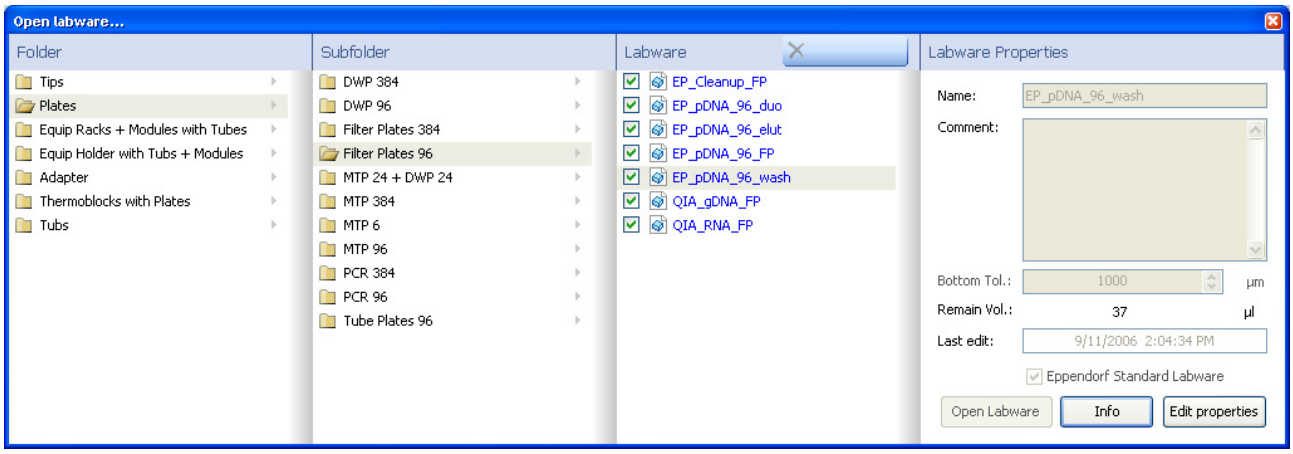


Fig. 1: Product properties in "Open labware"

You can display additional product information for selected labware, such as the article name, information about volumes, and order numbers, etc. To do so, click on Info in the file window or mark the desired labware in Worktable mode.

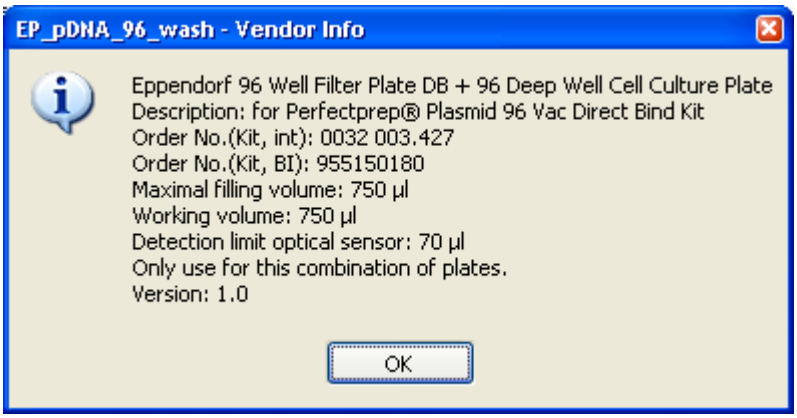


Fig. 2: Product properties in the file window (after you click on Info)

The same information is displayed in the Labware list of the Work tab (e.g., after opening an application) if a labware has been selected.

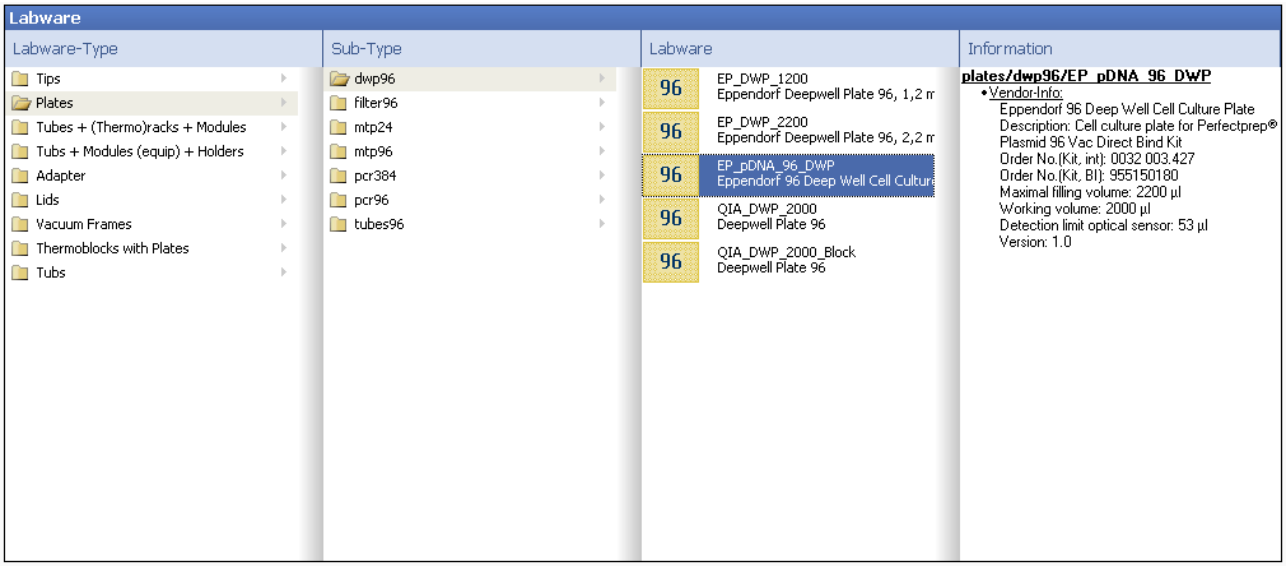


Fig. 3: Product information in Worktable mode

12.1.2 Overview of labware

12.1.2.1 epT.I.P.S. Motion

Fig. 2: 1000 µL

Fig. 3: 300 µL

Fig. 4: 50 µL

epT.I.P.S. Motion are single-use tips and are intended exclusively for dispensing tools belonging to the epMotion family of devices. The tips are available in three volume sizes to suit the volume of the dispensing tools (50 µL, 300 µL and 1000 µL), in each case with or without filter.

The Tips labware folder contains the selection of epT.I.P.S. Motion pipette tips.

Name in labware folder	Product name
tips1000	epT.I.P.S. Motion 1000 µL
tips1000f	epT.I.P.S. Motion 1000 µL, filter
tip300	epT.I.P.S. Motion 300 µL
tip300f	epT.I.P.S. Motion 300 µL, filter
tip50	epT.I.P.S. Motion 50 µL
tip50f	epT.I.P.S. Motion 50 µL, filter

Tips and racks are made of polypropylene (PP). The filter of the filter tips is made of polyethylene (PE).

NOTICE!

Positioning fault as a result of incorrect tip handling.

- Use tips only once.
- Do not autoclave tips. If purity conditions demand it, use filter tips of the PCR clean specification.
- Do not stack tip racks.

The coding on the tray informs the optical sensor about the volume of the tips and about whether or not these are tips with filters. As the coding is only on one side of the tray, the correct positioning of the rack on the worktable is important. Position the racks on the worktable so that the labeling of the rack or Tip Holder and the recess on the tray are facing toward you.

The optical sensor detects any supply of tips still available within a rack, i.e. tips in racks which have been started can continue to be used for subsequent methods. A prerequisite for this is that the tips in the rack are in contiguous positions.

NOTICE!

Faults as a result of tips missing from the rack.

The optical sensor detects only the initial and final position of tips in a rack. Missing tips removed from the center of a column by hand are not detected and will lead to faults in executing the method.

- Do not remove by hand any tips within an enclosed area on the rack.

A column in a tip rack which has been started and which has been created by use of a single-channel dispensing tool is detected by the software if you switch to a multi-channel dispensing tool and is not used. Tips from this started column will not be picked up until a single-channel dispensing tool is being used again later.

If you use an eight-channel dispensing tool, it will accordingly not use columns which have been started. In the case of multi-channel mode, eight tips are always picked up simultaneously.

If the optical sensor is switched off, the tips must be placed in the rack starting with coordinate A1. Columns must be complete.

12.1.2.5 Racks, thermoracks, thermoblock and thermoadapter

Racks are tube holders which can hold up to 24 tubes of a type. They are supplied primarily for tubes larger than 2 mL.

Tubes with a capacity of 2 mL and below are positioned in thermoracks.

A special type is the "two-location rack". This rack can hold 96 tubes of approx. 2 mL.

Thermoracks, thermoblocks and thermoadapters can be temperature-controlled on the thermal module.

Restrictions

Rack

The combination of a rack with a tube type occurs in the labware file window in the Equip Racks + Modules with Tubes directory.

No transport by the gripper.

Thermorack

The combination of a rack with a tube type occurs in the Equip Racks + Modules with Tubes directory.

Active cooling or heating on a thermal module.

Thermoracks can be transported with the gripper.

Thermoblock

The combination of a thermoblocks with a skirted, semi-skirted or unskirted PCR plate is specified in the software. No configuration or change possible.

Active cooling or heating on a thermal module.

Joint transport of thermoblock and PCR plate by the gripper.

Thermoadapter

Thermoadapters are available for 96-well and 384-well PCR plates as well as for the Deepwell plates 96. When supplying the worktable, you can place a plate on the thermoadapter in a similar way to putting labware on a height adapter. In contrast to the thermoblock, the thermoadapter and plate do not form a fixed combination. The thermoadapter and the thermoblock differ in visual terms by their different web lengths. The thermoblock also has cutouts with which the gripper of the epMotion 5075 can engage.

Racks and thermoracks can be combined with tubes by users with level 2 rights or administrator rights.

Racks for reagent tubes

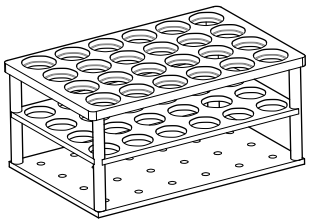


Fig. 6: Rack for 24 reagent tubes

The appropriate racks are available as tube holders for reagent tubes with diameters of 12 to 17 mm. The basic area of the racks corresponds to that of a microplate, i.e. they can be placed at any location on the worktable. The locations on a rack are numbered from 1 to 24. The rack is available in two different heights.

The optical sensor can use the coding of the racks to check that they are correctly aligned. The software issues an error message if the rack is inserted the wrong way round.

Tubes and racks may not exceed a total height of approx. 126 mm. The maximum immersion depth of the 300 µL and 500 µL tips is correspondingly less than that of the longer 1000 µL tips.

The administrator determines which tube can be used with which rack and is consequently available as a combination in the software.

Rack LC for LightCycler capillaries

The Rack LC is a tube holder for automatically filling LightCycler capillaries. It can hold 96 capillaries with a capacity of 20 µL or 96 capillaries with a capacity of 100 µL. The bores for both sizes of capillary are arranged in an alternating pattern.

In the software you will find the Rack LC under Plates\Tube Plates.

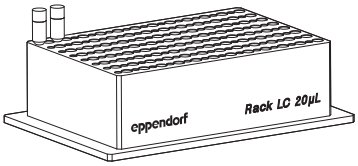


Fig. 7: Rack LC 20 µL

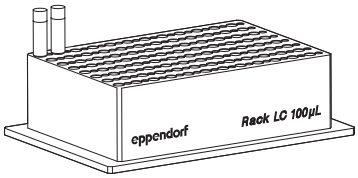


Fig. 8: Rack LC 100 µL

Using the Rack LC

1. Position the Rack LC on the worktable with its label on the front.
2. Select the labware for filling the capillaries from the Labware Tube Plates list.
3. Supply the Rack LC with only one capillary size per method run.

Rack 96 (Two Location Rack)

The rack is for the absorption of cryo tubes without lid (diameter similar to Safe-Lock tubes 1.5 or 2 mL). To be able to take 96 tubes, this special rack occupies two locations.

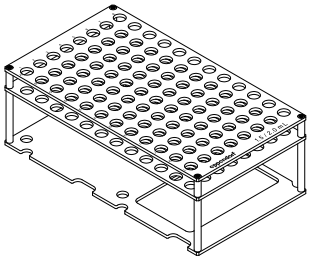


Fig. 9: Rack 96 (Two Location Rack)

CAUTION!

Risk of crashing if only one location occupied by Rack 96!

- When editing the worktable for the rack 96 always occupy **two Locations** a rear and a front location (e.g., A2 and B2).
- Define the same detection variant of the optical sensor for both locations.
- After the start of a method, also always make identical changes and entries for both locations of Rack 96 in the start worktable.

Do not use any tubes with lid.

Using Rack 96

1. Select Rack 96 in the labware folder `Equip Racks + Modules with Tubes` under the name `Rack96_1_5 – 2_0`.
2. Proceed as for supplying the 96-well thermorack when supplying this rack with tubes with an attached lid (Safe-Lock type tube). The position numbering of Rack 96 is rotated by 90° compared to a 96-well plate.
3. When supplying the worktable, place Rack 96 on the pins of the two locations. In the process, the opening in the bottom tray of Rack 96 must point towards the front.

Thermoracks and thermoracks TMX

For smaller tubes (e.g., Eppendorf Safe-Lock tube for 1.5 mL or 2 mL) a Thermorack/ Thermorack TMX which can be temperature-controlled with lid holder and 24 positions is available. The tube lids are held vertically in the holder to the right of the tube bore.

With the aid of 24 adapter sleeves you can also insert into the Thermorack/Thermorack TMX Safe-Lock tubes with a volume of 0.5 mL. The Thermorack/Thermorack TMX for the use with 0.5 mL tubes is also available with inserted adapter sleeves.

CAUTION!

Damage to the device from placing the thermorack on the thermomixer!

The thermorack is not suitable for application in the thermomixer. Using it in the thermomixer may result in damage to the device and dispensing errors.

- Do not place the thermorack onto the thermomixer!
- Only use the thermorack TMX on the thermomixer.

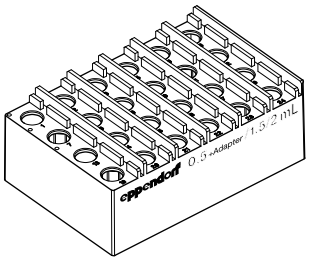


Fig. 10: Thermorack

The thermorack has a high heat capacity and retains the temperature away from the temperature-control over a longer time period. It has a slower heat transfer as the Thermorack TMX, i.e. it takes a bit longer to reach the desired temperature. Therefore the thermorack can also be applied for temperature-control on the epMotion without active temperature-control.

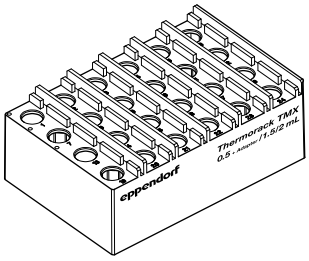


Fig. 11: Thermorack TMX

The Thermorack TMX is optimized for the application in the thermomixer as it is easier than the normal thermoracks and therefore permits higher rotational speed during mixing. It has a quick heat transfer and thus reaches the desired temperature quickly. The Thermorack TMX has a lower heat capacity as opposed to the normal thermorack and does not retain the temperature constant for a long time outside an active temperature-control. Therefore the Thermorack TMX is above all suitable for the application on a epMotion with thermo unit and/or thermomixer.

Thermoblocks and Thermoracks (96 Wells)

The thermoblock shown is available for 96-well PCR plates (e.g., Eppendorf twin.tec semi-skirted or skirted).

The thermoblock and plate then form a fixed combination in the method and can only be transported or exchanged together.

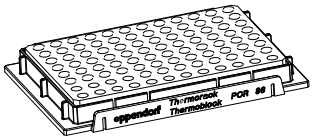


Fig. 12: Thermoblock/Thermorack

Skirted 96-well PCR plates can optionally be positioned in a location on the worktable with a 96-well thermoblock, a 96-well thermoadapter or solo if the administrator has defined them as a labware combination in the software.

Unskirted or semi-skirted 96-well PCR plates can only be positioned in a location on the worktable in conjunction with the 96-well thermoblock or 96-well thermoadapter.

The combination of Thermoblock and other PCR plates cannot be performed by the administrator, only by Eppendorf. Fixed combinations are predefined in the software for a variety of plates, e.g., for twin.tec plates.

Special case Thermorack and 0.2 mL tubes

If the thermoblock is to be equipped with 0.2 mL PCR tubes then the thermoblock turns into a thermorack in the software. The combination of a 0.2 mL tube with the thermorack does not have to be predefined in the Labware directory at the factory, it can be effected by the administrator in the Equip Racks + Modules with Tubes labware folder.

NOTICE!

Risk of collision as a result of projecting tube lids!

Carrier travel is optimized in the z direction. As a result, the tube lids may not point upwards. They could otherwise be contacted by the tips which could lose liquid in the process.

- Position 0.2 mL individual tubes and 8-tube strips so that their tube lids do not obstruct the path of travel or dispensing steps of the dispensing tool.

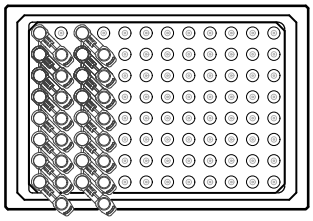


Fig. 13: Tube lid rotated by 45° in relation to the surface of the thermoblock

Use of the thermorack with 0.2 mL tubes

1. The best arrangement for the tubes is in columns, leaving every other column free for the tube lids. Therefore you can position maximum 48 tubes in the thermoblock (see image).
2. Specify the assignment in the transport pattern when programming the method. Supply at the start must correspond to the pattern.

Thermoblock (384 wells)

A special 384-well thermoblock is available for PCR plates with 384 wells.

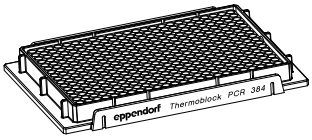


Fig. 14: Thermoblock (384 wells)

Regarding the use of the 384 PCR plates with thermoblock a fixed combination is available in the software just as with the 96-well PCR plates with thermoblock.

Thermoadapter

The thermoadapter cannot be transported by the gripper. But the gripper can remove a skirted PCR plate or a 96-well deepwell plate from the thermoadapter or place them on the empty thermoadapter. Thermoadapters can be positioned in a location with or without a plate at the start of the method. Active cooling or heating of a thermoadapter on a thermal module is possible even before a plate has been put on. The thermoadapter forms a temporary combination with a plate. The combination is the result of editing the worktable or a **Transport** command.

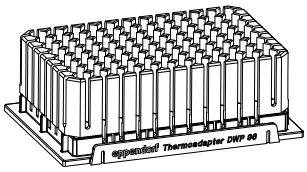


Fig. 15: Thermoadapter DWP 96

The combination "Thermoadapter with skirted PCR plate" can also be canceled again in the method by a **Transport** command. In terms of their combination options, thermoadapters are similar to height adapters. Note: PCR plates should always be placed on a thermal module together with a thermoblock or thermoadapter. A semi-skirted or unskirted PCR plate can only be used on the epMotion in combination with a thermoadapter or thermoblock. A semi-skirted or unskirted PCR plate can only be transported by the gripper in combination with the thermoblock.

When viewed from above, PCR thermoadapters look very similar to thermoblocks. However, they can be distinguished from one another from the side by the differing lengths of their webs.

Fig. 16: Thermoblocks and thermoadapters

Thermoadapter LC Sample

The Thermoadapter LC Sample is a tube holder for the automated filling of MagNa Pure LC Sample Cartridges. The adapter and the cartridge form a fixed combination and cannot be transported with the gripper. The adapter can be temperature controlled up to 70 °C. In the software you can find the Thermoadapter LC Sample+Cartridge under *Thermoblocks with plates*.

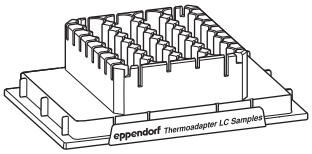


Fig. 17: Thermoadapter LC Sample

Cooling effect of thermoracks and thermoblocks

The PCR racks are cooled by being stored in the refrigerator (passive cooling).

Active cooling is possible using the thermal modules.

For the continued temperature curve, the following values apply as a guide.

Thermorack or Thermoblock	Plate or Tubes Used	Filling Volume per Well or Tube	Time taken to heat from 0°C to 10°C
R 1.5 / 2 mL	1.5 mL Safe-Lock	1000 µL	~ 30 min.
PCR 96	twin.tec 96-well PCR plate	150 µL	~ 14 min.
PCR 384	twin.tec 384-well PCR plate	25 µL	~ 10 min.

12.1.2.18Reservoirs and reservoir rack

To supply liquids, reservoirs in sizes 30 mL and 100 mL are available. Up to seven reservoirs are placed in a reservoir rack to position them on the worktable.

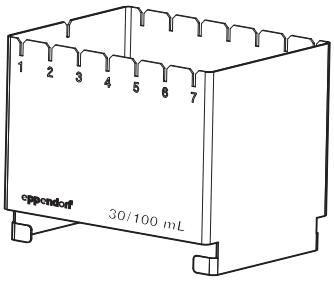


Fig. 19: Reservoir rack

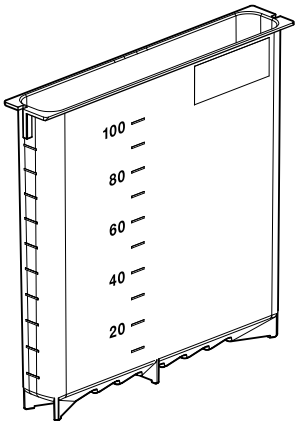


Fig. 20: 100 mL reservoir

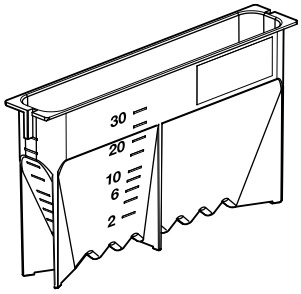


Fig. 21: 30 mL reservoir

The reservoirs are optimized for eight-channel mode:

- The 100 mL reservoir is recommended for 1000 µL tips.
- The 30 mL reservoir is suitable for all tip sizes.
- In conjunction with the eight-channel dispensing tool, 50 µL and 300 µL tips cannot reach the bottom of a 100 mL reservoir.

Some combinations of reservoirs in the reservoir rack are already predefined in the software. As administrator, you can furthermore define new combinations of reservoirs and reservoir racks.

The reservoir rack cannot be placed on the thermomixer.

For larger volumes, an autoclavable reservoir with a capacity of 400 mL is available. The remaining volume with these reservoirs is approx. 10 mL. The reservoir is made of polypropylene (PP).

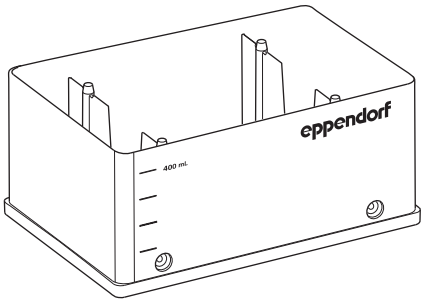


Fig. 22: 400 mL reservoir (Eppendorf)

Channeling plate and reservoir

In the context of Qiagen applications (QIAamp 96 DNA Blood and QIA_Rnsimple 96) for the epMotion 5075 VAC, a Channeling Plate 96 is used.

This can only be used with the 400 mL reservoir of the vacuum unit. Both parts are managed by the software as a single unit under the name EP_Res_400_PP_ChanP in the Tubs labware folder.

12.1.2.23Reservoir rack with module racks

You can insert up to seven different module racks supplied with tubes in the reservoir rack.

Tubes can be placed in the reservoir rack when they are in module racks and reservoirs with holders which can be temperature-controlled. Uniform tubes of the same type must be used within a module rack. The reservoir rack can be supplied in any sequence.

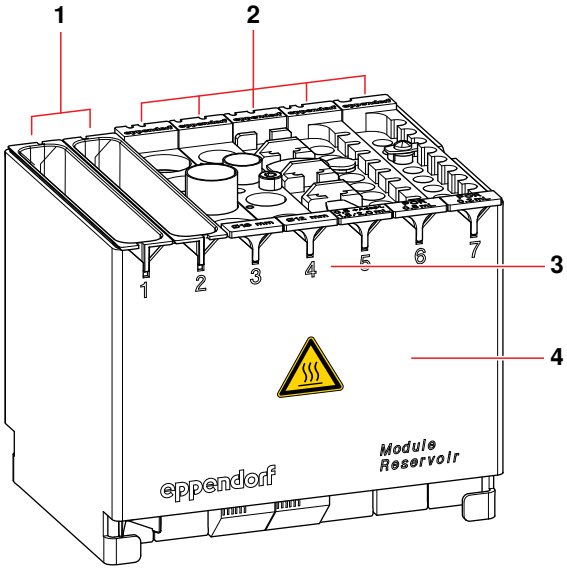
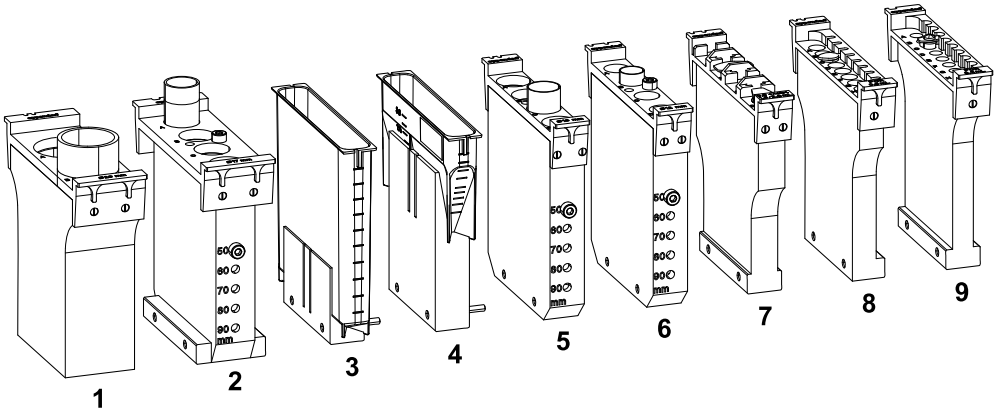


Fig. 24: Supplied reservoir rack

1 **Reservoirs**	2 **Module racks**
3 **Locations in reservoir rack**	4 **Reservoir rack**

You can use the following TC (temperature-controlled) module racks:



Item No.	Designation	Labware name for software
1	RR Module TC Ø 29 mm	Module TC 29mm
2	RR Module TC Ø 17 mm	Module TC 17mm
3	RR Module TC Ø 100 mL	Module TC Reserv100 mL
4	RR Module TC Reservoir 30 mL	Module TC Reserv30ml
5	RR Module TC Ø 16 mm	Module TC 16mm
6	RR Module TC Ø 12 mm	Module TC 12mm
7	RR Module TC Safe Lock	Module TC Safe Lock (for 2 mL and 1.5 mL Safe-Lock tubes) and Module TC Safe Lock 0.5ml (for 0.5 mL Safe-Lock tubes) (use with adapter)
8	RR Module TC PCR 0.5 mL	Module TC PCR0_5ml
9	RR Module TC PCR 0.2 mL	Module TC PCR0_2ml

Reservoir rack and module racks can be actively temperature-controlled.

The reservoir rack cannot be placed on the thermomixer.

CAUTION!

Burns from hot surfaces.

The reservoir rack may get hot during temperature control.

- Wait until the reservoir rack and the module rack have cooled down completely.

NOTICE!

Material damage as a result of incorrect positioning of module racks.

If the module racks have been put in the reservoir rack with the code facing forwards, there is a risk of collision and faulty dispensing.

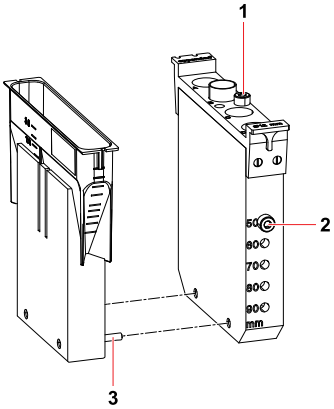
- Ensure that all module racks are inserted correctly.

Insert the module racks square in the rack with the coding facing backwards. The contact surfaces should be clean and be parallel on the plate of the thermal module. This ensures optimum temperature transfer.

During temperature-control, you should occupy empty positions in the reservoir rack with empty reservoirs and lids. This will reduce temperature-control time and minimize the temperature difference between setting and tube liquid. We recommend temperature-controlling supplied module racks to the desired temperature in advance in order to reduce temperature-control time still further. When temperature-controlling, take account of the fact that module racks are temperature-controlled less well in positions 1 and 7.

If you use the 30 mL and 100 mL reservoirs with holders which can be temperature-controlled they must be fastened by two connecting webs on each module rack.

If the reservoir rack is to be supplied exclusively with the reservoirs which can be temperature-controlled, a maximum of six positions in the rack can be supplied.



1 Adjusting pin in the depositing position	**2 Adjusting pin (here height adjustment 50 mm)**
3 Connecting web	

Bores in the module racks with diameters 12, 16 and 17 mm and two pins enable tubes of five different heights (50, 60, 70, 80, 90 mm) to be positioned. Both pins must be inserted on both sides at the desired height, even if not all the positions are occupied by tubes. The module racks with the diameters 17 and 29 mm occupy two positions in the reservoir rack.

Do **not** place the supplied reservoir rack on A locations or B0.

If you are using the reservoir rack with module racks and reservoirs in your method, you can only use irregular patterns. Exception: the reservoir rack is occupied throughout with identically loaded module racks or reservoirs. In this case, the pattern with automatic pattern detection and the standard pattern (in the case of sample transfer) can also be used.

Level detection can only be switched on or off for the entire reservoir rack. If you use supplied module racks next to one another which contain volume ranges which the optical sensor is unable to read (e.g., PCR tubes 0.2 mL and 0.5 mL), you will have to work with volume input.

NOTICE!

Material damage as a result of the gripper colliding with the module rack.

- Ensure that module rack and tubes do not exceed a height of 126 mm.

Possible module rack supply

The following list contains possible arrangements of module racks with predefined tubes:

Rack	Tube (labware name)	Manufacturer
RR Module TC Ø 12 mm	BD_Tube_5ml_1	BD Biosciences
	CHA_Tube_6_2ml	Chase
	GR_Tube_5ml	Greiner
	SAR_Tube_4_5ml	Sarstedt
	SAR_Tube_5000	Sarstedt
RR Module TC Ø 16 mm	BD_Tube_11ml	BD Biosciences
	BD_Tube_12ml	BD Biosciences

	BS_Tube_13ml	Bibby Sterilin
	Gr_Tube_11ml	Greiner
	SAR_Tube_10ml	Sarstedt
	SAR_Tube_11ml	Sarstedt
	QSP_Tube_11_5ml	QSP
	USP_Tube_10ml	USA Scientific plastic
RR Module TC Ø 17 mm	BD_Tube_14ml	BD Biosciences
	GR_Tube_14ml	Greiner
	GR_Tube_15ml	Greiner
	SAR_Tube_11ml_1	Sarstedt
	SAR_Tube_14ml_3	Sarstedt
	SAR_Tube_14ml_2	Sarstedt
	SAR_Tube_14_5ml	Sarstedt
RR Module TC Ø 29 mm	Roth_Tube_54ml	Roth

Temperature-controlling the module racks

The following values are intended as guide values for temperature-controlling module racks.

Module Rack	Tube	Temperature change from 23°C to 4°C		Temperature change from 23°C to 37°C	
		Set temperature	Temperature -control time	Set temperature	Temperature -control time
3 x RR Module TC PCR 0.2 mL or RR Module TC PCR 0.5 mL	PCR Tube 0.2 mL PCR Tube 0.5 mL	3°C	approx. 15 min.	38°C	approx. 8 min.
3 x RR Module TC Safe Lock	Safe Lock 0.5 mL Safe Lock 1.5 mL Safe Lock 2.0 mL	3°C 2°C 3°C	approx. 20 min.	38°C	approx. 12 min.
3 x RR Module TC Ø 12 mm or RR Module TC Ø 16 mm or 2 x RR Module TC Ø 17 mm	Tube Ø 12 mm Tube Ø 16 mm Falcon Tube 15 mL	3°C 3°C 2°C	approx. 30 min.	38°C	approx. 17 min.
2 x RR Module TC Ø 29 mm	Falcon Tube 50 mL	3°C	approx. 39 min.	39°C	approx. 23 min.
1 x RR Module TC Reservoir 30 mL	Reservoir 30 mL	1°C	approx. 21 min.	39°C	approx. 15 min.
1 x RR Module TC Ø 100 mL	Reservoir 100 mL	1°C	approx. 46 min.	40°C	approx. 28 min.

12.1.2.25Height Adapter

In order to keep transfer times and distances as short as possible for the carrier, there are various height adapters which can be used to compensate for plates of differing heights.

Height Adapter and plate may not exceed a total height of 126 mm. Combinations taller than 126 mm are rejected with an error message during configuration of the worktable.

For this reason, racks and reservoir holders may not be placed on height adapters.

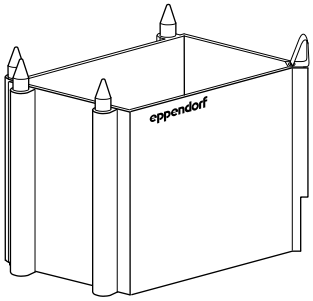


Fig. 26: Height Adapter

The adapters are marked with the height in question. The following heights are available.

40 mm: This adapter is suitable for use with 50 µL and 300 µL tips, for example. Labware which fits on taller height adapters can likewise be positioned here.

55 mm: This adapter is suitable for deepwell plates, 300 mL reservoirs, semi-skirted or unskirted PCR plates in a thermoblock and for some skirted PCR plates in a thermoblock, for example.

85 mm: This adapter is suitable for almost all microplates from 6 to 384 wells as well as almost all PCR plates with 96 or 384 wells. The Eppendorf PCR plate twin.tec (skirted, 96 or 384 wells) can be inserted with a thermoblock at this height.

Vac Holder: this adapter is required in conjunction with the vacuum unit. The Vac Frame is temporarily stored on the Vac Holder with the aid of the gripper. The Vac Holder is always positioned in location C4.

Thermoadapter Frosty

The Frosty thermoadapter is a special type. It is particularly suitable for users who have used the Eppendorf PCR Cooler during manual PCR setup and who wish to continue using this form of cooling. To do so, the cooling unit of the PCR Cooler is placed in a modified height adapter and a skirted PCR plate (e.g., a 96-well twin.tec PCR plate) positioned on that. Other PCR plates cannot be used. It is not possible to supply the cooling unit with 0.2 mL PCR tubes when using in the epMotion.

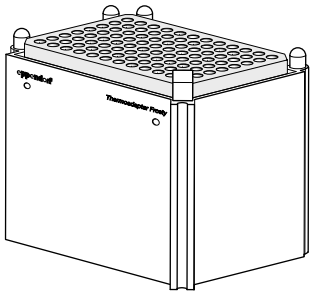


Fig. 27: Modified height adapter and cooling unit or "Frosty Thermoadapter"

The cooling unit does not affect the overall height of height adapter and skirted PCR plate.

Note on editing the method: when editing the worktable for the Frosty Thermoadapter (`Adap_frosty`), only select a skirted PCR plate for the location. The cooling unit to be used is not named in the software.

Notes on the cooling unit.

- The unit should be deep-frozen with the underside of the unit facing upwards.
- The cooling unit then displays the overshooting of a temperature of 7°C by changing color from purple to pink or from dark blue to light blue. A key factor in cooling samples is the color value in the depressions in the cooling unit.
- The cooling action of the cooling unit is comparable to manual use of the PCR Cooler.

12.1.2.28Plates

Files are available for the following labware:

- Microplates (MTP) with different numbers of wells
- Deepwell plates (DWP) with different numbers of wells
- Skirted PCR plates with different numbers of wells
- Filter plates
- Tube plates with 96 individual tubes
- Rack for microtubes in a 96-well grid

The plates described here can be positioned straight onto the surface of the worktable at a location. The prerequisite for this is that the plates in question have been activated in the software (see *Activate or deactivate labware on p. 91*).

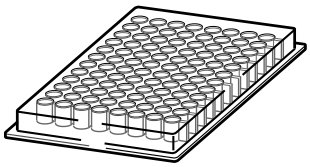


Fig. 29: Microplate (MTP) with 96 wells

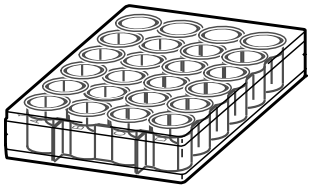


Fig. 30: Microplate (MTP) with 24 wells

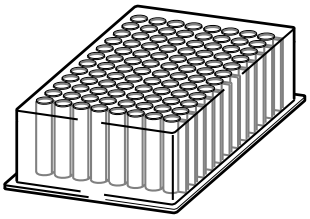


Fig. 31: Deepwell plate (DWP) with 96 wells

Semi-skirted or unskirted PCR plates can only be used on the epMotion in conjunction with a thermoadapter or thermoblock.

Plates and racks must be inserted at right-angles to the base.

In the Plates labware folder you will find a large selection of various plates. These are arranged in specific subfolders by plate type:

Tab. 2: Plates labware folder

MTP 96	Microplates, 96 wells
MTP 384	Microplates, 384 wells
MTP 24 + DWP 24	Microplates and deepwell plates, 24 wells
MTP 6	Microplate, 6 wells
PCR 96	PCR plates, 96 wells
PCR 384	PCR plates, 384 wells
DWP 96	Deepwell plates, 96 wells
DWP 384	Deepwell plates, 384 wells
Filter Plates 96	Filter plates, 96 wells
Filter Plates 384	Filter plates, 384 wells
Tube Plates 96	Plates with up to 96 individually removable tubes

12.1.2.32Lids

CycleLock for skirted and semi-skirted twin.tec PCR plates

The CycleLock seals a skirted or semi-skirted twin.tec PCR plate in the Mastercycler ep once the motorized lid has been closed. The CycleLock includes a metal frame and an elastic mat.

The metal frame of the CycleLock has an elastic mat fitted, the texturing of which faces upwards. The mat must be completely flat on the frame. The texturing helps improve the contact pressure from the motorized lid in the Cycler.

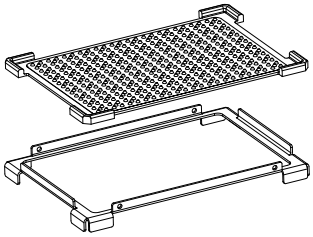


Fig. 33: Mat and frame of the CycleLock

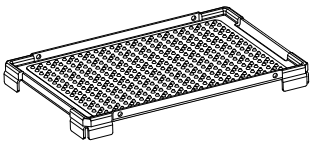


Fig. 34: CycleLock

NOTICE!

Material damage as a result of the gripper colliding with the cycler.

- Ensure that the mat is lying flat on the CycleLock frame. Projecting corners, an incorrectly positioned mat or a loose mat represent a considerable risk of collision for both transport by the gripper and for the cycler.

Vac Lid (epMotion 5075 VAC only)

The Vac Lid (epMotion VAC sealing foil U.S. Pat. No. 6,666,978) contains 96 bores which match the positions of the 96 wells of the filter plates. If there are unfilled wells in a filter plate, the relevant bores of the Vac Lid can be covered with Vac Lid mats. This improves extraction of the liquid.

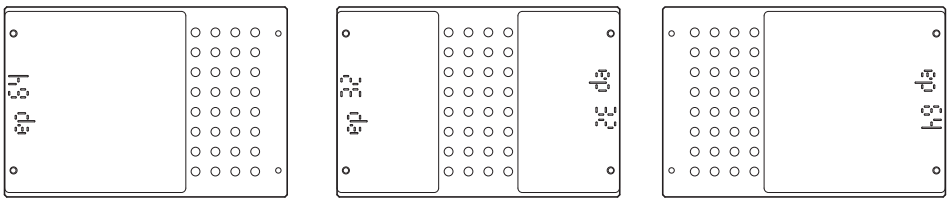
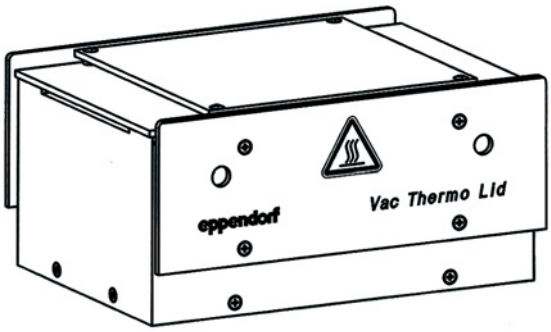


Fig. 35: Examples of covering

16, 32, 48, 64 or 80 bores of the Vac Lid can optionally be covered by Vac Lid mats. The number of bores which can be covered is embossed in the individual Vac Lid mats. The Vac Lid mats are held in the correct position on the Vac Lid with the aid of pins.

Vac Thermo Lid (epMotion 5075 VAC only)

epMotion 5075 VAC only. The Vac Thermo Lid is for optimizing vacuum steps within automated nucleic acid preparation methods. Using the Vac Thermo Lid the remaining alcohol in filter plates can be minimized in a **Vacuum** command. This reduces the risk of alcohol contamination in sample solutions.



To use the Vac Thermo Lid, it is necessary for there to be a thermal module on the epMotion. The Vac Thermo Lid can only be placed on a thermal module next to the vacuum unit.

However, the Vac Thermo Lid cannot be placed on the thermomixer.

CAUTION!

Burns from hot surfaces.

- The underside of the Vac Thermo gets hot during temperature control.
- Wait until the Vac Thermo Lid has cooled down completely.

- The heating of the Vac Thermo Lids to 110°C (max. achievable temperature) takes approx. 30 min. For the expedient execution of a method it is therefore useful to bring the Vac Thermo Lid to the desired temperature before starting the method.
- When placing the labware on the worktable ensure that no reservoir rack with modules (only reservoir racks with reservoirs) are in the transport path of the Vac Thermo Lids. The height of this labware means it is not possible to travel over it.
- The maximum stack height is 126 mm.

Position the Vac Thermo Lid on a thermal module and heat it to a temperature of 110°C. The high heat capacity of the lid stores the heat. Before the actual start of the **Vacuum** commands the Vac Thermo Lid is transported by the gripper via a **Transport** command from the thermal module to the vacuum unit. During a **Vacuum** command air is sucked inside the Vac Thermo Lid through the 96 boreholes which heats up when flowing through the block. The heated air flows through the filter plates and supports elimination of the remaining alcohol in the process. After exiting the **Vacuum** command the Vac Thermo Lid must be positioned on the temperature control unit again via another **Transport** command.

12.1.3 Abbreviations used

Each labware Name includes information about the manufacturer and labware type, e.g., **EP_pDNA_384_MTP_1** (EP = Eppendorf, pDNA_384 = Collection Plate for PerfectPrep Plasmid 384 Kit, MTP = micro test plate). If no manufacturer abbreviation is used, it is an Eppendorf item. In the following sections you will find explanations of the abbreviations used.

12.1.3.1 Manufacturer

Abbreviation	Manufacturer
AB	Abgene
AXYG	Axygen Scientific
ABI	Applied Biosystems
BD	BD Biosciences
BRAN	BRAND
BS	Barloworld Scientific
CO	Corning/Costar
ELK	Elkay
EP	Eppendorf AG
FALC	Falcon
GENE	Genetix
GR	Greiner
IWA	Iwaki
LAMB	One Lambda
MAT	Matrix
MI	Millipore
MJ	MJ Research
MN	Macherey+Nagel
NUNC	Nunc/Nalgene
PACK	Packard
PALL	Pall
POR	Porex
PR	Promega
ROB	Robbins
QIA	Qiagen
SAR	Sarstedt
SCI	Scientific
TPP	TPP
USP	USA Scientific
WHAT	Whatman

12.1.3.2 Other abbreviations in labware names

Abbreviation	Description
DWP	Deepwell plate (DWP) with 24, 96 or 384 wells
FP	Filter plate
MTP	Micro test plate with 6, 24 ... 96, 384 wells
PCR	Plate for PCR (Polymerase Chain Reaction)
TP	Tube plate (plate with individually removable tubes)
Cleanup	Plate is included in the PCR Cleanup Kit
DNA/RNA	Plate is included in the kit for purification/isolation
TT	Eppendorf twin.tec
PCR Plate Thermo	Fixed combination of thermoblock and PCR plate
Numbers	For example _5ml_ or _200_ = maximum filling volume (each tube or well) in mL or µL.

12.1.4 Labware definitions

The following folders are present for labware and labware combinations:

Labware folder/	Contents	Description
Tips	Pipette tips	(see p. 186)
Plates	Various subfolders for plates (e.g., MTP 96, Tube Plates)	(see p. 199)
Equip Racks + Modules with Tubes	Combinations of racks, thermoracks and tubes and Safe-Lock tubes and for supplying module racks	(see p. 187)and(see p. 194)
Equip Holder with Tubs + Modules	For reservoirs, supplied module racks and the reservoir rack	(see p. 194)and(see p. 196)
Adapters	Height adapters and thermoadapters	(see p. 198)and(see p. 192)
Lids	CycleLock, Vac-Lid and Vac Thermolid	(see p. 200)
Vacuum Frames	Vac Frame 1, the frame for the filter plates in PerfectPrep test kits and Vac Frame 2 for Qiagen filter plates	(see p. 198)
Thermoblocks with plates	Fixed combinations of skirted PCR plates (in which temperature-control of the thermoblock is to be used) and semi-skirted or unskirted PCR plates (which cannot be placed in a location without an adapter). In these cases, the thermoblock functions as an adapter and if required, for temperature-control.	(see p. 191)
Tubs	Reservoirs with a capacity of 400 mL or 300 mL which can be positioned in a location without an additional holder For example, both reservoirs can be used in the vacuum unit as collection vessels.	(see p. 193)

12.1.5 Compile your own labware combinations

The labware combinations are summarized in the labware file window in folders. You can activate or deactivate labware in the folders.

You can also create your own labware combinations from the components that are available (e.g., rack-tube combinations), or delete them using the icon or the Delete popup menu.

When editing a method, activated labware combinations as well as activated labware are displayed in a list.

12.1.5.1 Folder for labware and labware combinations and liquids

Beyond the preconfigured standard labware available ex works, it is also possible to dimension individual or external labware for use with the epMotion 5075 and to incorporate it in the labware directories of the software. For more information on this, contact Eppendorf Service.

12.1.5.2 Request labware definition

You can find more than 350 labware files for downloading at www.epMotion.com.

If tubes or plates you require are not yet defined in the software, send the appropriate request to the following address:

Eppendorf AG

Application Support:

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12.2 Tools (dispensing tools)

Dispensing tools are piston-stroke pipettes working on the air-cushion principle. If the piston in the dispensing tool moves up, liquid can be aspirated into the tip. Piston movements in a downward direction dispense the liquid. The piston movement is effected by a stepper motor in the carrier, in all 8 channels simultaneously in multi-channel tools.

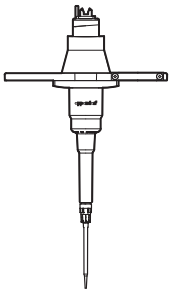


Fig. 3: Single channel dispensing tool TS 50, volume range 1-50 µL

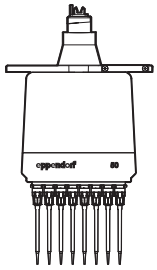


Fig. 4: Eight channel dispensing tool TM 50-8, volume range 1-50 µL

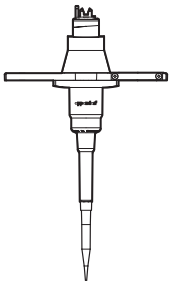


Fig. 5: Single channel dispensing tool TS 300, volume range 20-300 µL

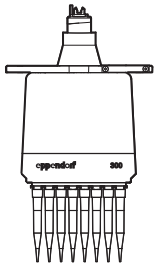


Fig. 6: Eight channel dispensing tool TM 300-8, volume range 20-300 µL

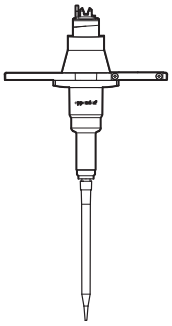


Fig. 7: Single channel dispensing tool TS 1000, volume range 40-1000 µL

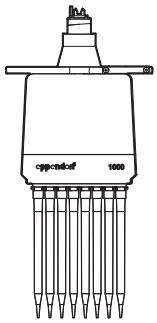


Fig. 8: Eight channel dispensing tool TM 1000-8, volume range 40-1000 µL

More information about tools can be found in the product description of this operating manual (see *Dispensing tools (tools) on p. 15)*.

Following the start of a method, all the subsequent steps run fully automatically.

- If required, the Optical Sensor checks the correct selection, positioning and filling level of tubes and the supply of tips in Tip Racks.
- The correct dispensing tool is detected by the code in the tool.
- Depending on the dispensing tool, one or eight pipette tips are picked up.
- If the further procedure has been defined in the method by supply of the worktable and in the procedure by commands, the carrier moves the dispensing tool to the source location. The required liquid is aspirated. The carrier then moves the dispensing tool to the first destination location.

Furthermore

- Water can be pipetted from 1 µL and multidispensed from 3 µL.

An undershooting of the recommended dispensing volumes is possible but it is your own responsibility. Ensure that in this case the dispensing for your application is sufficient.

- Depending on the method, other destination positions are possible. The dispensing or transport pattern is likewise specified within the command.
- The number of samples can be entered at the start or specified with priority in the method.
- The time of the pipette tip change can likewise be programmed.
- Liquid can likewise be mixed in the pipette tip before aspiration and after dispensing.
- Optimum dispensing parameters are achieved by selecting a liquid type in the commands.
- If other commands in a method require different dispensing tools, the change in dispensing tool which will have to be performed by the user is shown in the display in the started method.

12.3 Thermal module

The temperature of thermal modules can be set in the software from 0 °C to 110 °C.

Tab. 3: Duration of cooling and heating of different components with the aid of the thermal module

	Filling volume with water/ well	**Cooling from 25 °C to 4 °C** at a temperature setting to	**Minutes**	**Heating from 25 °C to 37 °C** at a temperature setting to	**Minutes**	**Heating from 25 °C to 95 °C** at a temperature setting to	**Minutes**
Thermal module without labware			5		2		8
With a thermoadapter with a 96-well skirted twin.tec PCR plate on it	50 µL	3°C	7	38°C	5	104°C	11
With a thermoblock with a 96-well skirted twin.tec PCR plate on it	50 µL	3°C	6	37°C	4	101°C	10
With a thermoadapter with a 384-well skirted twin.tec PCR plate on it	10 µL	3°C	5	37°C	5	103°C	8
With a thermoblock with a 384-well skirted twin.tec PCR plate on it	10 µL	3°C	5	37°C	5	98°C	7

With 24 well thermorack with 0.5 mL Safe-Lock tubes	350 µL	3 °C	24	37 °C	16	101 °C	35
With 24 well thermorack with 1.5 mL Safe-Lock tubes	1200 µL	3 °C	30	38 °C	18	104 °C	44
With 24 well thermorack with 2.0 mL Safe-Lock tubes	1700 µL	3 °C	25	37 °C	17	100 °C	40

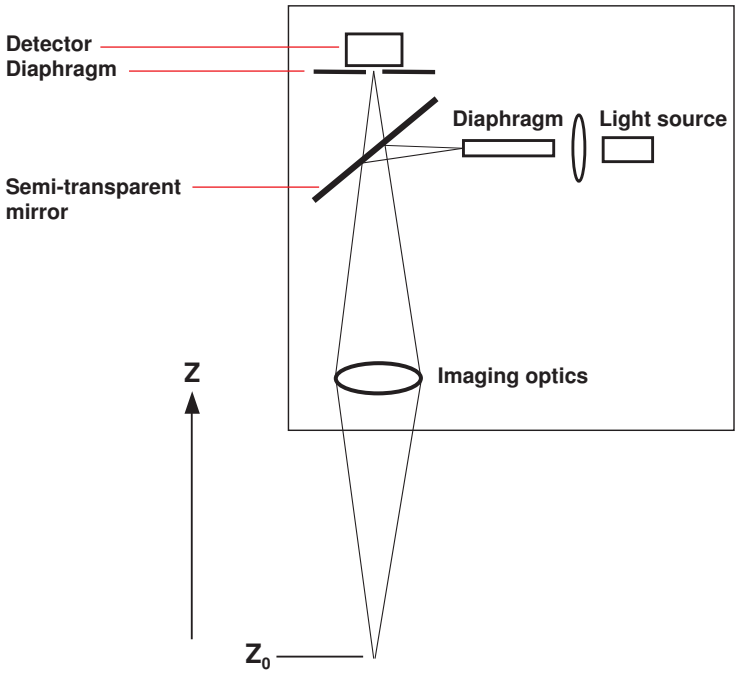
The statements made here apply to an ambient temperature of approx. 25 °C and to the edge positions of the labware in question. The thermal modules were temperature-controlled to the relevant target temperature before the labware was put on.

12.4 Optical sensor

12.4.1 Function

The optical sensor (U.S. Pat. No. 6,819,437) is used, among other things, for detecting the filling level of tubes. If you are working in a method with defined and constant volumes and you specify these when editing the method, filling level detection can be dispensed with. On MTPs with 384 wells and 0.2 and 0.5 mL tubes, it is not possible to measure liquid. Liquid measurement is not recommended for MTPs with 96 wells.

Principle



The reflection of light is detected by a receiver with the aid of a lateral light source, a semi-transparent mirror, a lens and motion in the z direction in the desired position; the software then evaluates the maximum. The reflections of light provide information about surfaces and liquid level. Detection operations can be performed using the reflections of light.

Use the Functions tab to define a default setting for the optical sensor:

- Liquid detection (detection of liquid surfaces) (see p. 208)
- Tips (tip detection) (see p. 209)
- Locations (detection of location occupation) (see p. 210)

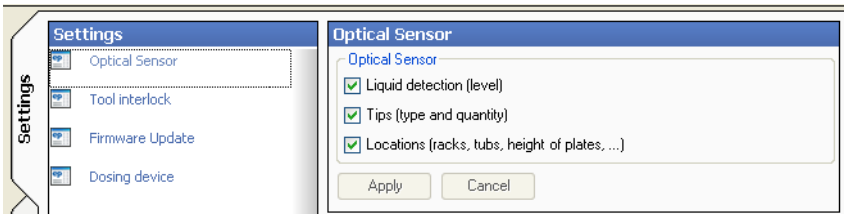


Fig. 1: Default setting of the optical sensor via the Functions tab

Double-click on the labware on the worktable to show the detection variants. In Worktable mode you can switch scanning of liquid surfaces on or off for any marked labware:

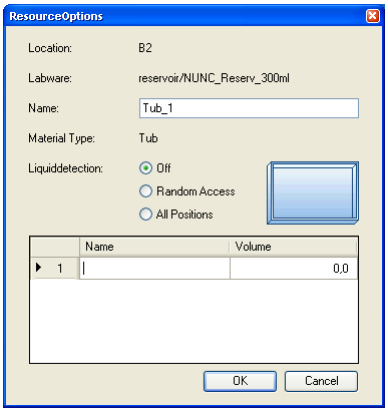


Fig. 2: Detection variants in Worktable mode

To switch scanning on or off for a specific run for all locations, activate the corresponding option immediately after starting the method.

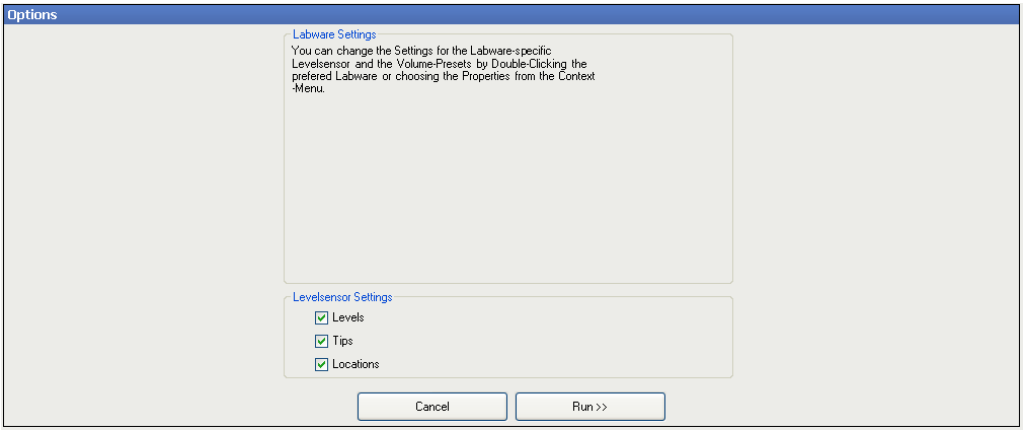


Fig. 3: Adjusting the optical sensor after starting the method

If the filling volumes of the tubes are easy to detect in the method to be started, you can reduce processing time by switching off the optical sensor and entering volume manually. If destination tubes are empty, it is quicker to enter a volume "0" than to scan with the optical sensor. Filling volumes which are known should be defined when you edit the method.

If the optical sensor is switched off, a display for entering filling volume is automatically faded in as the method continues.

Detection is possible up to a labware height of 126 mm.

12.4.2 Detection version 1: detecting liquid surfaces

Level Detection applies generally for Liquid Detection in all labware. You switch Level Detection on or off when you start a method.

If Levels is activated, the surface of the liquid is scanned in the case of labware for which Liquid Detection is set to All positions. If Levels deactivated, there is no detection of liquid surfaces (liquid detection).

Liquid Detection relates to the labware. Liquid Detection switches the optical sensor for detecting the surfaces of liquids on or off. When detecting the surface of a liquid, the optical sensor can only detect approximately horizontal (plane) surfaces. The surface must be at 90° ± 3° in relation to the optical beam axis. If the curvature of the surface is too extreme as a result of the physical properties of the liquid, tube or tube geometry, the optical sensor can no longer detect the liquid level. In this case, the user must enter the volume.

It is not possible to detect filling levels in 384-well plates; it is recommended to only a limited extent for 96-well plates to minimize the time required. Where Number of Samples ≤10, only Off and All Positions are displayed for selection.

12.4.2.1 Liquid Detection selection options

Off

If you set the optical sensor to Off, 24 individual volumes can already be defined for a 24-tube rack when editing, for example:

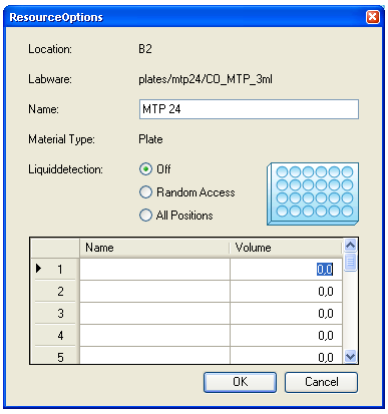


Fig. 2: Liquid Detection in Worktable mode

If you start with the volume entry in the first row, the volume will be adopted for all positions automatically. To do this, mark the Volume column and then click in another field. One correction per row is then possible.

For locations in which the optical sensor is switched off, the required volume is automatically displayed upon starting. The volume is displayed if the volume has been specified in the Worktable. Volumes can be corrected at this point. Empty destination locations are not automatically displayed to allow the volume to be checked and entered at the start of the method. If a volume is to be displayed automatically for destination labware at the start, enter a volume not equal to "0" when editing. If you are using the Rack 96 (two-location rack), you must make identical entries to the worktable for the two occupied locations.

Random Access

Random access allows scanning for the first and last position plus 8 other random positions. Random access is recommended when tubes or wells have very similar filling levels within a location and the scanning procedure time is to be reduced.

Random access performs liquid detection only in positions which are defined via Number of Samples and Pattern. In the case of random access, the smallest volume determined is always used for all tubes or wells of a location for aspirating or dispensing the liquid. If there is a number of samples of 10 or less when the method is started, all the tubes affected are scanned by the optical sensor.

Notes: If filling levels differ significantly in one location, check whether the Aspirate from bottom and Dispense from top options are better alternatives to Random Access.

All positions

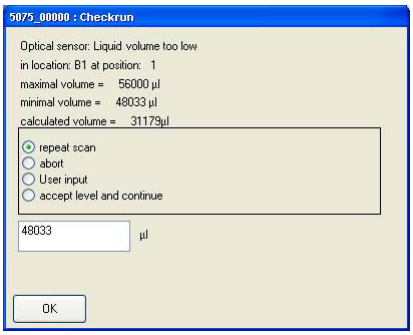
If automatic detection is required, Liquid Detection must be marked with All Positions.

If all wells are scanned in a 96-well plate or 24-tube rack, each volume is administered separately when a single-channel dispensing tool is used.

In the case of eight-channel dispensing tools and a 96-well plate, the following applies: observe the largest volume within a column (8 wells) when dispensing liquid. Observe the smallest volume within a column (8 wells) when aspirating liquid.

12.4.2.3 Optical sensor check run

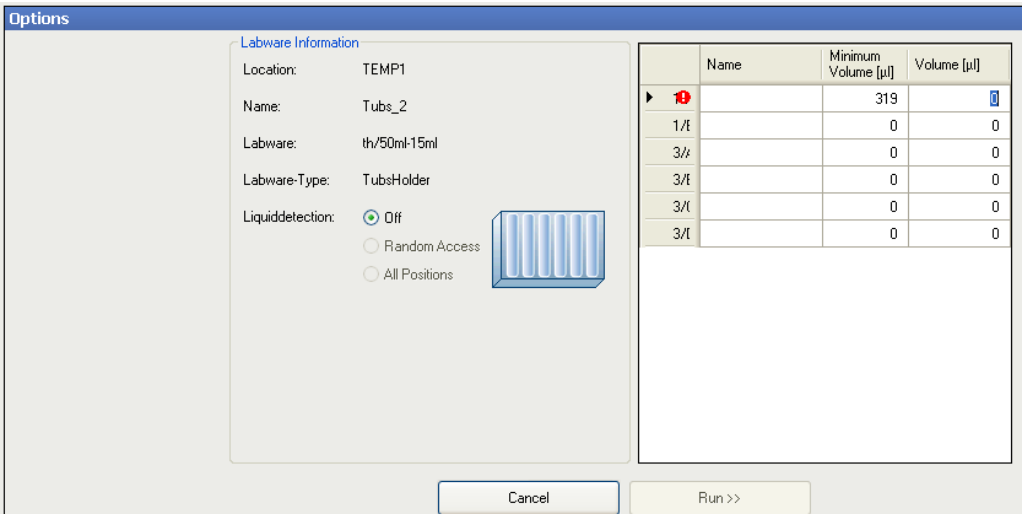
If the optical sensor is unable to perform location detection successfully, you have the option of bypassing detection and entering the volume manually. To do so, mark User input. Check first whether the correct labware is positioned in the location. The method may not be continued if there is incorrect labware in the location.



12.4.2.4 Switch Level Detection on and off

If Level Detection is switched on and if variants for scanning the surface of the liquid are selected in the method for these locations, scanning is effected in the start routine.

If Liquid Detection for labware or Level Detection are switched off, all the volumes required are queried at the start.



If you would like to specify the volume, exceed the specified minimum volume after the start. Make sure that you do not exceed the maximum volume. Once you have completed your input, press Enter. The entry should match the actual filling level of tube.

The specified volume does not take account of the way the shape of the meniscus of the liquid varies in the different tubes, for example. An inadequate volume could therefore lead to faulty dispensing.

At the start, it is possible to make an individual volume entry or volume correction for each tube in racks and reservoirs. With 96-well and 384-well plates, the one volume input applies to all wells.

12.4.3 Detection variant 2: Tip detection

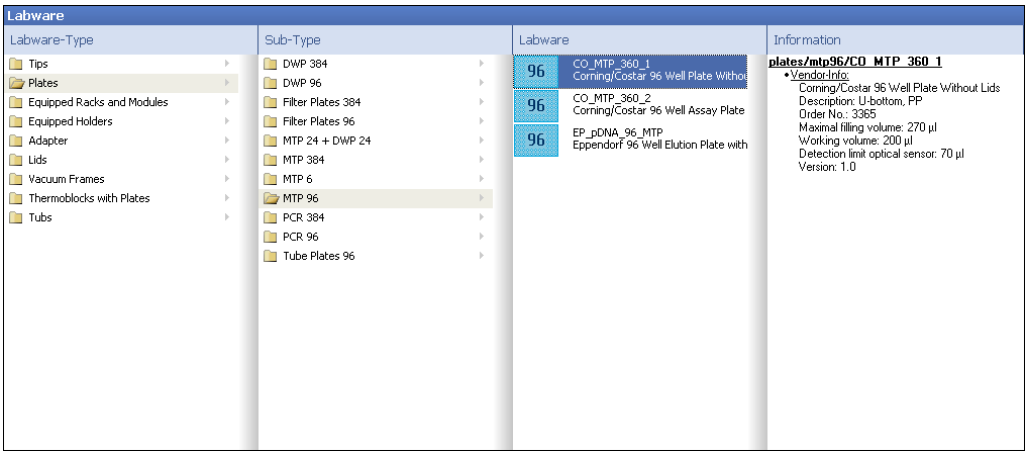
Both the identity of the tip racks (volume range; with/without filter) in the locations and the presence of tips in the rack are detected. A code on the sides of the tip rack enables the tip type and supply quantity to be detected. If more tips are required for the method than are present, these extra tips are requested in the method once the existing tips have been exhausted. If tip detection is switched off, you will have to ensure that the tip rack is adequately supplied starting from the back left (coordinate A1) and that the specifications of the worktable corresponds to the method to be started.

12.4.4 Detection variant 3: Location detection

A code in the corresponding racks enables correct occupation of a worktable location to be detected. Even racks positioned the wrong way round are detected, with the exception of reservoir racks. Plates are detected by height.

12.4.5 Detection limits

Depending on tube geometry, there are different detection limits for the optical sensor when detecting filling level (liquid detection). Information about the detection limits can be displayed if you click on Info in the file window. So that aspiration can be performed from tubes with filling levels below the detection limit of the optical sensor, a volume must be entered at the start of the method. This entry can be made in the start routine using the keyboard, even after the relevant error message from the optical sensor. The detection limit of the optical sensor generally starts at filling levels above 3 mm.



13 Appendix B: Software

13.1 Commands, parameters, options

This section includes detailed information about commands and parameters. This information is supplemented by the descriptions in the section entitled "Operation".

The parameters and options of the commands are described in detail in the section entitled "Sample Transfer". Parameters and options of individual commands which deviate from Sample transfer are described separately.

13.1.1 Number of Samples

Use the **Number of Samples** command to specify how many samples are to be processed in the subsequent steps of the procedure. It applies to all commands until the next **Number of Samples** of the procedure. If you do not enter this command, a question is asked about the number of samples when the device starts up. This entry then applies to all the commands of the method.

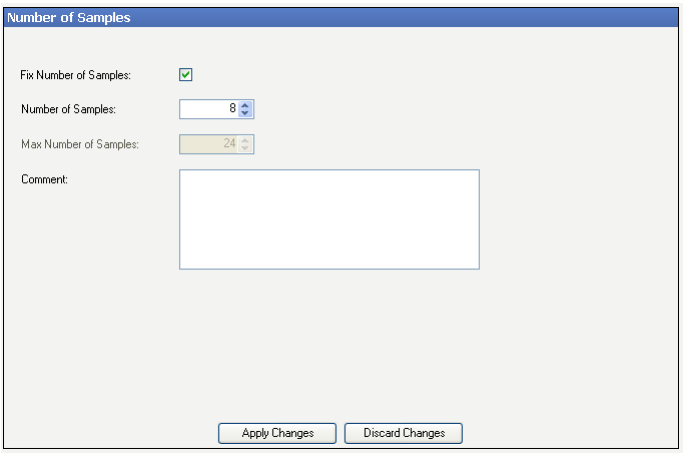
The maximum number for **Number of Samples** results, dependent on the command, from the plate or rack type in the destination or source tube location. For example, the largest value for two 384-well plates is 768.

Further restrictions on the maximum number result from the pattern and the number of tubes per rack or wells per plate. For example, the sum of the aspiration locations in the source tube location during **Sample Transfer** can be smaller than the sum of the dispensing locations in the destination tube location.

Depending on the type and purpose of the subsequent commands Number of Samples has different effects:

- Sample Transfer: number of samples picked up by the source tube plate.
- Reagent Transfer: number of wells of the destination tube plate into which the reagent is dispensed.
- Dilute: number of samples to be diluted.
- Pool and Pool One Destination: number of wells in the source tube plate from which liquid is aspirated.
- Mix: number of wells in the plate in which the liquid is mixed.

13.1.1.1 Define parameters



- Fix Number of Samples:

  Activate this option if a fixed number of samples is to be defined for each method start. At the start, there is **no** Number of Samples request.

  Deactivate this option if the number of samples at the start of the method is to be entered by the user.

- Max Number of Samples:

  At the start of the method, the number entered here is accepted as the maximum input value. When the pattern is displayed, Max number of Samples is taken into account.
- Comment is displayed at the start of the method and the Number of Samples request. The comment can provide information about which entries are meaningful here or to which commands the entry relates (e.g., maximum number of samples, to single-channel or eight-channel dispensing tool and Reagent or Sample Transfer).

Fix Number of Samples and Max Number of Samples both apply until the next Number of Samples command in the procedure.

The Number of Samples request is asked first at the start. If Number of Samples is contained several times in a procedure, the request occurs in succession as many times as required (exception Fix Number of Samples).

If part of a procedure in the method is not to be executed, enter "0" as a value.

13.1.1.2 Information about entering Number of Samples

- **Eight-Channel Dispensing Tools**

  Example for Number of Samples entries with an eight-channel dispensing tool:

  An entry of "1" to "8" means that 8 "samples" will be processed. An entry of "9" means that 16 "samples" will be processed etc. This applies correspondingly to a 384 plate. Note that with a 384-well plate, only every other well in a column will be served by the eight-channel dispensing tool. Further procedure depends on the pattern.
- **Sample Transfer**

  Example: a 96-well plate is to be filled by two full 24-position racks. For every rack the method contains a Sample Transfer command in which a rack has been defined as source tube. The **Number of Samples** command has been entered once. In order to transfer 24 samples to the plate from both the racks, enter the value "24". A total of 48 transfers is thus effected. An entry of 10 would mean that in each rack, the tool aspirates from 10 locations. The maximum number for Number of Samples is 24.

  If both racks are to be processed consecutively, a Sample Transfer command with both racks as source tube is defined in the method. An entry of 30 would then mean that the Sample Transfer would be carried out in full in the first rack (24 transfers) and six times in the second rack. The maximum number for Number of Samples is 48.

  In order for the different execution options to be detected at the start, enter a comment on the Number of Samples when editing the method.
- **Reagent Transfer**

  The entry of the Number of Samples for the Reagent Transfer relates to the destination tube.
- **Dilute**

  Number of Samples before the **Dilute** command defines the numbers of samples to be diluted. The dilution steps are defined in the pattern. Dilution steps are possible only within a location; they are limited by a row or column. In other words, with a 96-well plate, all the wells of one row can be filled with diluent and 12 dilution steps could be performed. In this case, the undiluted sample would be aspirated from another location in the first step.
- **Pattern**

  Examples for limiting the Number of Samples by the pattern in a Sample Transfer: If only every second sample is aspirated from a 96 well plate (source tube), the maximum input is: 48 (96 : 2 = 48).

  If one sample is aspirated from a 96 well plate (source tube) and dispensed twice into another 96 well plate (destination tube), then the maximum Number of Samples is 48.

  Reason: Sample Transfer applies here from one source tube to one destination tube; here 48 x 2 = 96 applies. If, however, a second 96 well plate was available in the command as destination tube, the 96 samples could be transferred either continuously (first plate A complete, then plate B) or alternating (plate A, plate B, plate A, etc.). Whether the transfer is continuous or alternating is defined in the pattern of the method.

13.1.2 Sample Transfer

The command transfers samples from several locations of a source tube plate to several locations of a destination tube plate in accordance with the defined patterns.

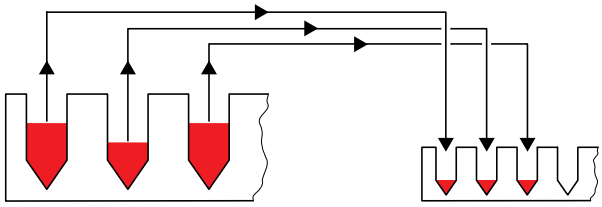
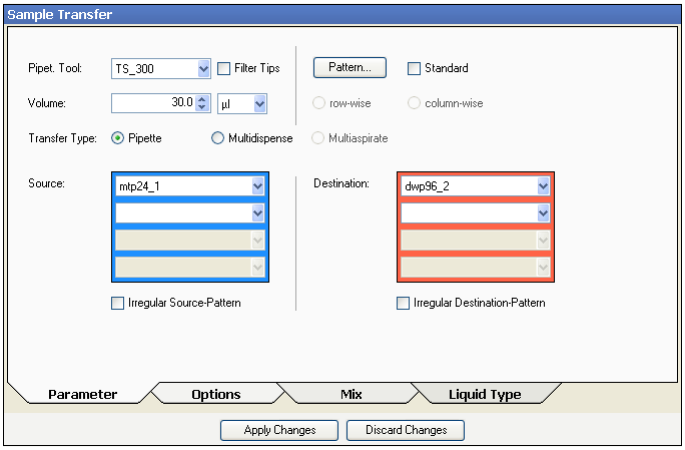


Fig. 1: Diagram of Sample Transfer

The number of samples picked up from the source tube plate depends on the preceding command Number of Samples.

13.1.2.2 Define parameters



Pipet.Tool Select Dispensing Tool The name "TS" (tool, single channel) stands for single-channel dispensing tools while "TM" (tool, multi channel) stands for eight-channel dispensing tools. The selection depends on the tubes used as well as on volume. Eight-channel dispensing tools cannot be used with 24-tube racks, for example. When selecting the dispensing tool, be aware of immersion depth into the tubes.

Filter Tips: Define whether tips with filters are used in the method.

Volume Enter the volume and select µL or nL. With volumes of up to 99.9 µL a decimal place is available.

Transfer type Pipette: Aspiration and dispensing of the volume entered.

Multidispense: Dispensing of the volume entered at every dispensing step. Number of steps and quantities aspirated depend on the Number of Samples.

With small volumes, pipetting always provides better free-jet capability as well as precision and correctness. When pipetting, in contrast to multidispense, only the required volume is aspirated and dispensed. However, please note that multidispense represents a very rapid type of dispensing. With the multidispense option, a 96-well plate can be filled in 35 to 60 seconds.

However, with multidispensing the measurement errors identified for pipetting are exceeded(see *Dispensing Tools on p. 173)*.

Source and Destination: A selection is only possible if the worktable is already equipped with labware. When you press the Source or Destination button, displays with corresponding selection lists are available. The selection is made using the labware positioned on the worktable. Up to four locations can be selected as source or destination tubes within a command.

After selecting the source and destination tubes the respective labware names are displayed.

You can also dispense within a plate, in which case the source tube and destination tube are identical.

If the source tube or destination tube labware is deleted from the worktable, the labware name is shown in gray in the parameter configuration. The source tube or destination tube labware has to be defined afresh or an error message is issued when starting the method.

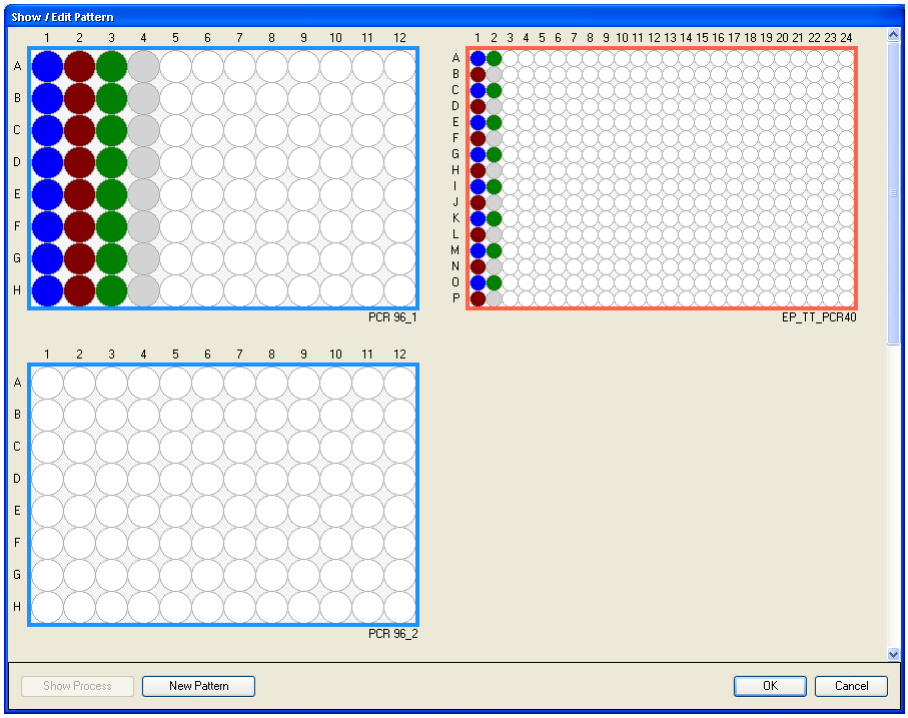
Pattern: Define pattern. You can define Pattern using automatic pattern detection, simple standard pattern (Sample Transfer only) or free pattern (irregular). The patterns are independent of direction. Regular patterns are detected by the software after just a few entries and completed without further entries.

If the labware is changed after the pattern has been entered, the appropriate warning appears when new labware is selected. If the same tube type (e.g., MTP 96) is retained, the pattern can be adopted.

If no destination tube is defined in the pattern in default pattern or in pattern with automatic sample detection, the software automatically completes the pattern in the direction of the rows (from left to right).

13.1.2.3 Pattern with several plates as source or destination tubes

If several plates are available as source tubes and/or destination tubes, the display pattern is expanded as follows:



Begin entering the pattern with the top labware. The labware is displayed here in the order of the source or destination tube definition. The source tube is shown on the left, the destination tube on the right.

If the same sample or liquid is to be transferred to specific wells of all plates following the same pattern, an entry for all plates in the Source or Destination display is only required for the first transfer. During the second transfer only an entry in the very first labware of the source or destination is required.

13.1.2.4 Example pattern for several plates

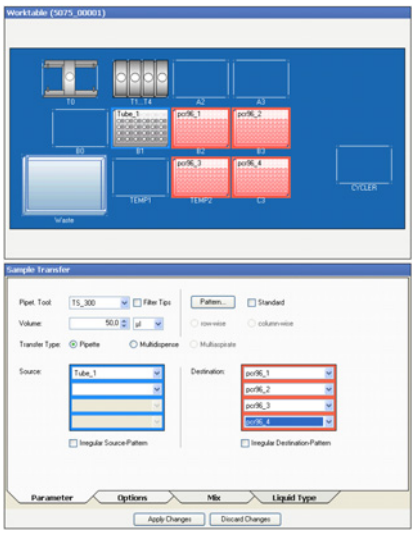
Detailed descriptions on pattern can be found in the chapter "Operation" (see *Editing the pattern for a Transfer command on p. 69)*.

Objective

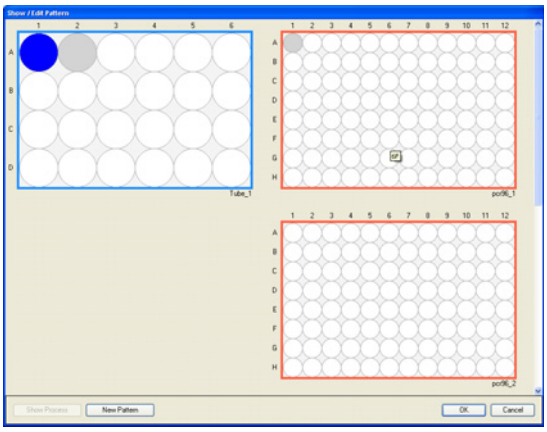
One sample is to be transferred from a 24-tube rack in each case eight times to four 96-well plates. The pattern for one plate is also to apply to the other plates.

This example describes only the steps relevant to a pattern. It is assumed that the worktable has been supplied and commands and parameters have been specified.

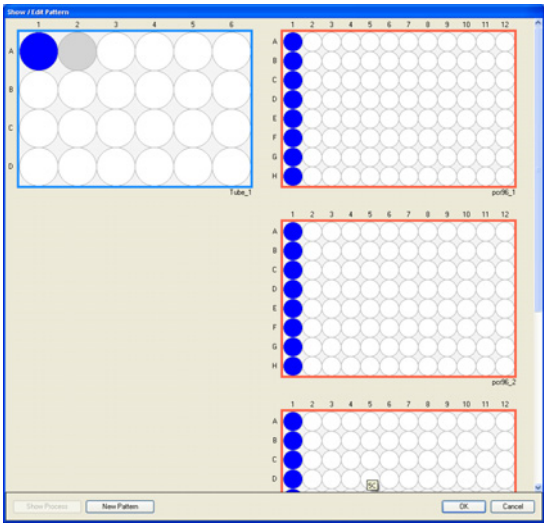
1. Define the 24 well rack as source tube.
2. Define the 96 well plates as destination tube.



3. Define the pattern. To do so, define an aspiration location of the source tube.



4. Define the dispensing locations of the destination tube.



5. Click on the first well in the second plate.

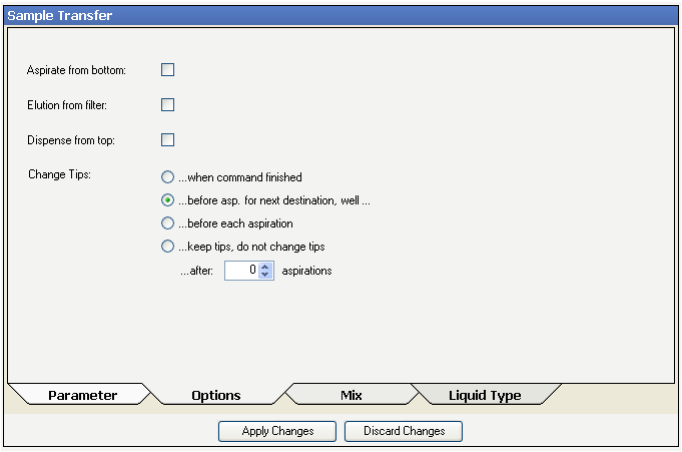
   The entire column will be adopted in accordance with plate 1. Continue analog with additional destination tubes.

6. Complete the pattern. Subsequently the pattern for the destination tube only has to be entered for the first plate. The pattern is transferred to all additional destination plates.

13.1.2.5 Options

You can make further settings via Options.

Immersion depth and dispensing height

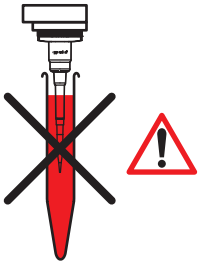


Aspirate from bottom

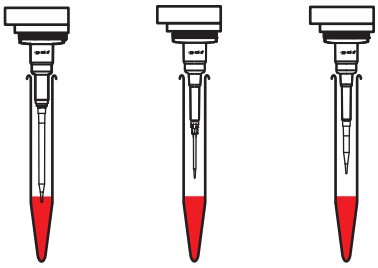
This version is especially recommended for smaller tubes. It is not necessary to scan MTP and PCR plates if the required volume is much smaller than the existing one.

At start only enter a volume for the plate which approximately corresponds to the actual volume and allows for any aspirations and additions which may be required. The volume entered does not affect the position of the pipette tip with Aspirate from bottom or Dispense from top. To prevent the tubes overflowing during aspiration, the filling level of tubes must not exceed the working volume. With Aspirate from bottom, the tip is positioned approx. 1 mm above the bottom of the tube. The distance from the bottom of the tube depends on the tolerances of the tube type and can be modified by the administrator. After liquid has been aspirated, the tip is moved slowly out of the tube.

Aspirate from bottom is not recommended for tubes > 3 mL with high filling levels. In the case of viscous solutions, the outer wetting which results may increase the risk of contamination and falsify the dispensing result.



With very large tubes (e.g., Falcon or Reservoir) and high filling levels, it is even possible for the entire tip and the cone of the dispensing tool to become wet. You should always avoid high filling levels.



With large tubes, the length of the 50 µL and 300 µL tips and the dispensing tool result in restrictions on immersion depth, leading to a higher remaining volume compared to the 1000 µL tip.

Dispense from top

Dispense from top is a fast version for dispensing a liquid into a destination tube, because the z movement up to approx. 3 to 4 mm above the liquid prior to dispensing is omitted. Liquid is dispensed in the top area of the tube. The tubes may not be filled above maximum filling volume. Dispense from top can also be used for pipetting and on smaller tubes or plates with different filling levels. As the tip remains in the top area of the tube and does not move down into the tube, the risk of contamination is virtually ruled out. The greater distance from the liquid may impair target accuracy at minimal dispensing volumes. With a small volume and tubes > 5 mL, the tip might not reach the bottom of the tube or the liquid provided. There is a risk of the liquid touching the tube wall above the liquid provided. With larger volumes, liquid could well splash up. Certain dispensing speeds may not be exceeded for acceptable dispensing. Dispense from top should be validated by corresponding trials.

Elution from filter

This function is especially suited to the aspiration of liquids from corresponding filter plates (currently only PCR cleanup filter plates). The following special features apply to this option:

- Do not enter a volume for Sample Transfer.
- The piston movement in the dispensing tool for aspirating liquid starts as soon as the tip starts moving down in the well. Maximum stroke is used on every dispensing tool. This also applies to dispensing.
- The tip travels gently into the resilient filter material.
- In combination with the test PCR cleanup a Mix before aspirating is recommended.
- The Elution from filter function relates to the source tube.

  With the elution function, virtually complete aspiration of the liquid from the filter plate is achieved.
- In the Sample Transfer command under Transfer Type select pipette.
- The aspired liquid is dispensed into the destination tube.

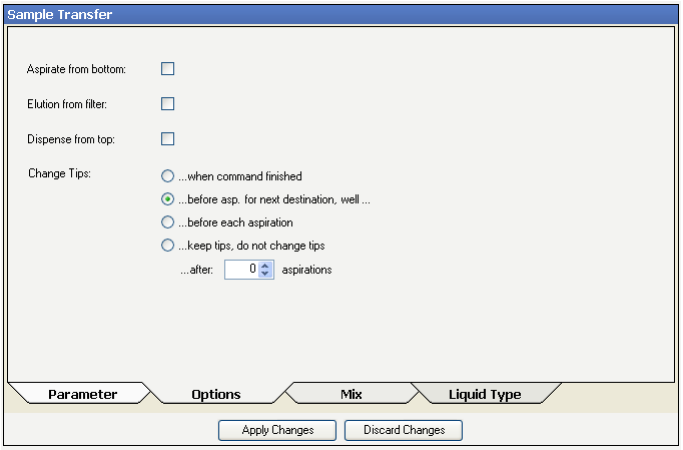
When transporting the liquid, the usual appearance of the liquid in the pipette tip does not apply. There may be air bubbles at several points in the pipette tip. The air segment at the bottom end of the pipette tip may not be clearly pronounced.

At different volumes you save time if the optical sensor is not used to determine liquid level. However, selecting Aspirate from bottom and Dispense from top ensures that liquids are dispensed and professionally dispensed. You are still asked at the start to enter a volume for a plate with 96 wells (exception: destination plates which had a volume "0" when the worktable was edited). The intention is to select an average volume for all wells with Aspirate from bottom or Dispense from top.

13.1.2.6 Changing pipette tips (Change Tips)

Under Options you can determine the time when tips are changed.

The following is displayed:



Change tips ...

- ... when command is finished

  The tips are not ejected until the command is finished. This is recommended in the case of repeated aspiration of a particular reagent for filling all the wells of a plate, for example.
- ... before asp. for next destination, well

  Tip change before aspirating from a new location. If many different liquids are aspirated from a plate or rack, the new liquids must not come into contact with old remaining liquid in the tip. Tip change is therefore advisable.
- ... before each aspiration

  No tip is filled twice, Even if it is the same source tube for the aspiration. Should always be used for Mix after dispensing to prevent contamination of the source with liquid traces from mixing in a destination tube.
- ... keep tips, do not change tips

  The tips continue to be used in the next command. If the next command is likewise defined keep tips, do not change tips, use also continues to the command after next and so on (sensible if a nutrient medium is to be distributed on many empty plates, for example). Particularly with liquid which tends to foam, failing to change tips after multiple aspirations can lead to extra volume in the tip. This extra volume may cause contamination of the dispensing tool. If transfer type pipette is changed to multidispense, after the first command an ejection occurs even if keep tips, do not change tips is selected.
- ... after: aspirations In the input field you can set the number of strokes after which the tips should be ejected. This function is available if ... keep tips, do not change tips has been selected.

Special features of multidispense:

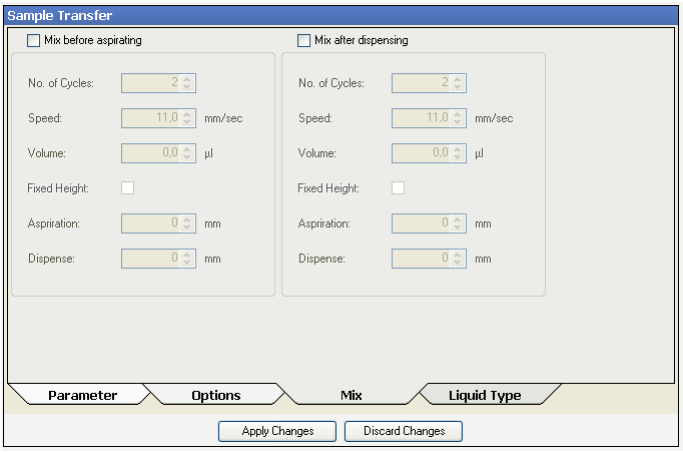
With multidispense, a slight extra volume needs to be aspirated.

- ... before asp. for next destination, well:
  - Extra volume is returned into the old source tube
  - Change tip
  - Liquid aspiration from new source tube
- ... before each aspiration:
  - Extra volume is discarded into the waste
  - Change tip
  - Liquid aspiration from new or old source tube

13.1.2.7 Mix

Mix before aspiration or after dispensing

If Mix before aspirating and/or Mix after dispensing is selected, a display for setting mixing parameters appears when you click on the adjacent button.



If Fixed height is **not** selected, the following applies:

- The settings for immersion depth, blow-out (to remove remaining liquid), delay time to start blow-out etc. are automatically taken from the selected liquid type.
- If Aspirate from bottom has been selected, this immersion depth also applies to Mix before aspirating.
- If Dispense from top has been selected, the volume known at the start is used for mixing in conjunction with the Liquid type immersion depth for Mix after dispensing.

Unlike with all other forms of dispensing (free flow) in dispensing with mixing there is contact with the liquid in the destination tube. Particular note should be taken of this when setting tip change.

Mixing volume is always less than the current filling volume in the tube, as the remaining volume of the aspiration cannot be used for mixing. The remaining volume for the correspondingly marked tube may be viewed in the Labware properties section via the Open a labware window, for example. In the case of very large tubes (e.g., 15 mL Falcon) larger remaining volumes result with the 50µL and 300 µL tips in combination with the geometry of the dispensing tool than with the 1000 µL tips.

In the case of deviations from the predefined liquid type, determine the optimum mixing speed in trials. Carefully increase mixing speed during these trials. Use very high speeds only for correspondingly viscous solutions. At very high speeds, large volumes and multiple mixing cycles, liquid may get into the dispensing tool (e.g., foam formation). The use of filter tips will increase reliability.

The complete mixing process takes place in the liquid. When the liquid is aspirated and dispensed, the dispensing tool is moved on accordingly in the z direction. Blow-out is performed at the end above the liquid. A mixing cycle consists of an upward and a downward movement.

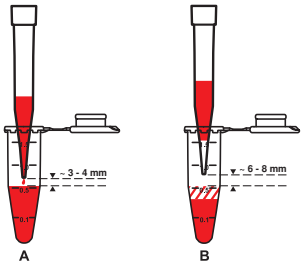
The Mix after dispensing mixing variant can only be used in conjunction with the Pipette dispensing variant.

More information on mixing is provided separately (see *Transport on p. 232)*.

13.1.2.8 Liquid types

If liquids whose physical properties of viscosity, vapor pressure and surface tension differ significantly from those of water are to be dispensed, we recommend selecting a different liquid type. The predefined liquid types are arranged to work at a consistent immersion depth for aspiration. During aspiration, the dispensing tool moves on to suit aspiration speed, tube geometry and aspiration volume.

Check every selected liquid type and every parameter change in conjunction with other commands by test-running the method. The predefined liquid types represent recommendations. Adapt the settings to your requirements as necessary.



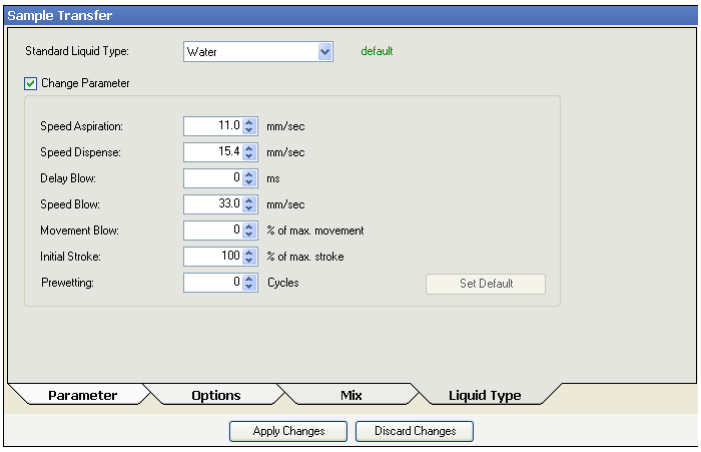
A Dispense	B Drawing-up Following Aspiration
Dispensing is effected approx. 3 to 4 mm above the liquid. During dispensing, the tool moves up so that the gap is maintained. Exception: liquid type "ProteinC" at 5 mm	Before the liquid is transported, the liquid is drawn up in the pipette tip so that the bottom part of the tip contains air during the transport operation.

The following liquid types are available:

Liquid Type	Dispensing data optimized for	50 µL tip: pipetting from	50 µL tip: dispensing from	Remarks
Alcohol 75%	Mixture of 75% ethanol and 25% water	1 to 3 µL	3 µL	Washing reagent in kits for nucleic acid purification. See applications in ep-Folder Nucleic acid prep. Speed Aspiration: low to medium Speed Dispense: low to high
Alcohol 98%	Alcohol 98%	1 µL	3 µL	A new tip is prewetted with the liquid for aspirating. Speed Dispense: low Only for multidispense using 300 µL filter tips: very small gap from filter with 300 µL aspiration. To avoid filter being wetted, in this case default to pipetting from 280 µL.

Liquid Type	Dispensing data optimized for	50 µL tip: pipetting from	50 µL tip: dispensing from	Remarks
Glycerol	Mixture of 40% glycerin and 60% water	1 µL	5 µL	Glycerin content in many enzyme solutions is much less than this, so Water can also be used as the liquid type here. Speed Aspiration: medium Speed Dispense: medium to high; ZN 300-8:low
Protein	Water with 1% albumin (10 g/l), 0.01% Triton X-100	5 µL	5 µL	When using a new tip, prewet it with the liquid to be aspirated before the first dispensing operation. Attention! Curvature of the liquid surface will impair free-jet capability when dispensing into cell culture plates. See Proteinc. Speed Aspiration: low to medium Speed Dispense: low to medium
ProteinC	As for Protein	As for Protein	As for Protein	Proteinc uses when dispensing higher distance to the calculated plain liquid surface (4 to 5 mm) than Protein. All other data such as Protein. Recommended for nutrient media. Speed Aspiration: low to medium Speed Dispense: low to medium
Rinse	For demineralized water and water with a low surfactant content; use the mix option or independent MIX command	1 µL	3 µL	Like the Water liquid type but with a significantly delayed blowout. Recommended, e.g., in combination with mix to reduce the residual moisture in the tip, but it can also increase the contamination risk regarding smaller containers (e.g., wells in PCR plate). Speed Aspiration: medium Speed Dispense: medium
Speed_xl	Demineralized water; mixed by means of high dispensing speed	1 µL	3 µL	Thorough mixing in a 96-well DWP, for example, with a 750 µl sample and 750 µl dispense. Caution! Higher risk of contamination, especially with small tubes because of high dispensing speed! Speed Aspiration: medium Speed Dispense: medium to high
Speed_xs	Demineralized water; very low aspiration speed to avoid raising sediment	1 µL	3 µL	E.g., for slow aspiration from filter plates. Speed Aspiration: very low Speed Dispense: medium
Water	Demineralized water	1 µL	3 µL	Technical data relating to systematic and random measuring deviation was determined using this liquid type. Recommended for most methods. Speed Aspiration: medium Speed Dispense: medium

Change parameters of the liquid type



The first time the display is called up, the standard parameters specified in the software for the previously-selected liquid type, the previously-entered volume and the previously selected dispensing type are displayed. This is indicated by **default** in the top right of the display. In the event of changes, the display changes from **default** to **changed**. The liquid type can be reset to the default parameters at any time with the **Set Default** button.

The variation of **Movement Blow**, **Speed Blow** and **Delay Blow** serves to optimize the dispensing of remaining liquid.

Tab. 4: Liquid Type Parameter

Parameter	Input range	Remarks
Speed Aspiration	0.2 to 110 mm/sec	In the case of viscous solutions and relatively large aspiration volumes, **Speed aspiration** should be increased only moderately so that the delayed aspiration of liquid can be completed before the z movement of the carrier. Low values are meaningful for phase separations, for example, or to avoid raising sediments or particles.
Speed Dispense	0.2 to 110 mm/sec	Especially when dispensing relatively large volumes into an empty tube, the risk of liquid splashing back can be reduced by lower **Speed Dispense** values. At higher values, be aware of the increased risk of contamination from the liquid splashing out. Higher values are meaningful, for example, when dispensing into a relatively large tube to achieve more thorough mixing.
Delay Blow	0 to 99990 msec	With liquids which have higher wetting properties and consequently delayed draining characteristics, we recommend increasing **Delay Blow**. The time can be set to zero for liquids which do not wet very much. Increasing **Delay blow** means that the method takes longer.
Speed Blow	0.2 to 110 mm/sec	The term *Blow* is used to describe the blow-out like with a manual pipette. At lower values for **Speed Blow**, bubbles may form at the outlet opening of the pipette tip in liquids with low surface tension.
Movement Blow	0 to 100%	Extent of piston stroke in the blow-out step. This is slightly different depending on dispensing tool. **Speed Blow** and **Movement Blow** can be varied with the objective of reducing the splashback of the liquid to be dispensed or the liquid already in the tube.

Parameter	Input range	Remarks
Initial Stroke	0 to 100%	Extent of piston when blowing out air after completed absorption of liquid. With changes of Initial Stroke the tips are changed automatically due to technical reasons.
Prewetting	0 to 9 cycles	Prewetting is carried out only with a new unused tip in order to create the same conditions for the first and for subsequent dispensing steps. It is recommended for liquids with a low vapor pressure to enrich the air space in the dispensing tool with evaporated liquid to a comparable extent in all cases. It is also recommended for liquids with reduced surface tension and consequently delayed draining properties so as to achieve comparable prewetting of the tip with solution for all dispensing steps. Prewetting (1 cycle) it preset with the liquid types Alcohol 98%, Protein and ProteinC.

If the optimal setting of Initial Stroke is changed, it may lead to cross contamination.

Changes in the liquid types are carried out at one's own responsibility and can possibly lead to a deterioration of the technical data.

Please check the setting regarding the dispensing accuracy for each application.

The speed of liquid aspiration, liquid dispensing, drawing up and blow-out are optimized for the liquid in question in each liquid type in order to achieve low-contamination dispensing up to the working volume of the tubes.

With critical liquids, start checking with demineralized water. If this is successful, repeat the test with the liquid actually envisaged.

The following must be confirmed in the check:

- Adequate precision and correctness are still achieved.
- No liquid splashes out (probability of contamination remains unchanged at low).

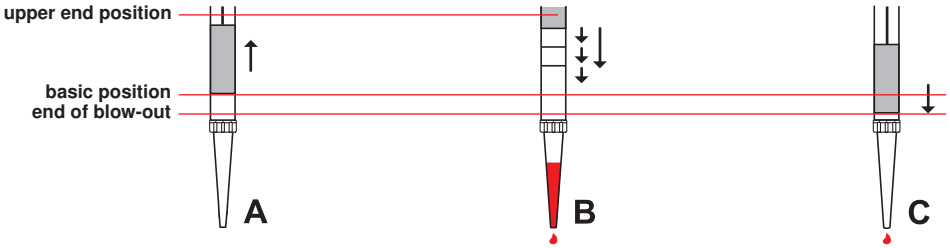


Fig. 9: Aspirate, dispense and blow

A Aspirate To aspirate a sample, the piston moves upwards from the default position.	**B Dispense** **Multidispense**: return to default position by means of short individual steps. **Pipette**: total path in one step.
C Blow Remaining liquid is discarded by means of blow-out.	

13.1.3 Reagent Transfer

A reagent is transferred from a source tube labware location to several destination tube labware locations. Reagent Transfer is best suited to transferring a reagent to several plates.

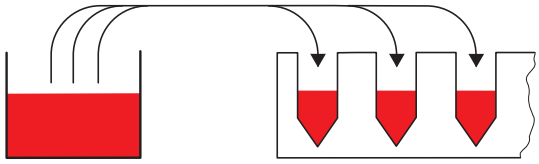


Fig. 1: Reagent transfer principle

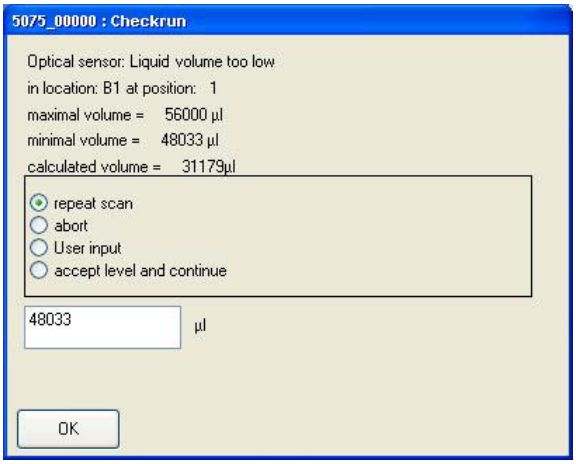
In Reagent Transfer the entry for Number of Samples relates to the destination tube.

All other entries and selection options are comparable to those of Sample Transfer.

In Reagent Transfer several source tube locations with liquid might be present.

13.1.3.2 Special case: use of several sources

For Reagent Transfer you can define methods in which more than one tube is defined as source tube. The software can access the next tube automatically after the first tube has been emptied, to fill the destination plate for example. You no longer have to fill the first tube completely.



If the optical sensor is switched on, the first source tube is scanned. If, during this process, the software detects that there is too little liquid for the number of samples, the Checkrun window appears. The minimum volume, maximum volume and calculated volume are displayed. You can now select how the optical sensor is to proceed (continue, abort, etc.).

To incorporate the next tube in the calculation, select accept level and continue. The optical sensor continues by scanning the next tubes. The volumes determined are totaled and the method started when the volume is adequate.

The optical sensor also detects empty tubes that have been defined as source tubes in the pattern. The message appears with a Calculated volume of 0 µL. Confirm with Accept level and continue to scan the subsequent tubes.

If the level detection is switched off, a request for entering the volume appears for the source tube locations of the pattern. The total volume required is assigned only to the first tube in the entry list. For all other source tube locations the left-hand column contains "1". The "1" serves as a reminder to assign the individual volumes to the tubes.

13.1.4 Dilute

Dilute facilitates the creation of dilution series. A defined volume is transported from well to well by means of pipetting. Before the **Dilute** command diluent (diluent reagent) must be dispensed using a Reagent Transfers. The Reagent Transfer command fills the wells with the diluent required. Dilute can be executed using a source plate (undiluted samples) and a destination plate (dilution steps).

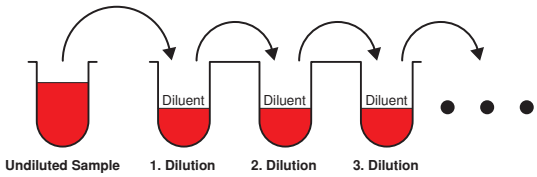
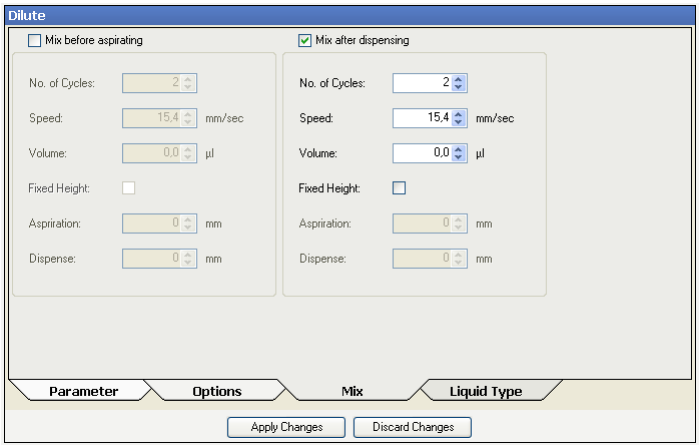


Fig. 1: Dilute command principle (destination tube plate)

The **Number of Samples** command before Dilute defines the numbers of samples to be diluted. The dilution steps are defined in the pattern and only possible within one location. They are limited by a row or a column.

If the Dilute command is executed within a single plate, the source and destination tube areas on the plate must not overlap. This can be achieved by limiting the number of samples with the Number of Samples command.

To achieve thorough mixing of sample and diluent, under Mix you should use Mix after dispensing. Mixing is performed after every dispensing step. Mix before aspirating refers only to mixing before the first aspiration, i.e. mixing the undiluted sample. All other entries and selection options are comparable to those of Sample Transfer.



13.1.4.2 Example dilution series

This example explains the principle of a dilution series. This is not a concrete application.

Sequence and objective of a dilution series

- 24 samples are in a rack with 24 containers and are to be diluted 1:1000.
- Dilution takes place in 3 stages with 1:10 dilutions in each case.
  To achieve this, the 24 samples are transferred to a 96-well plate.

Diluent is transferred from a 300 mL reservoir to the 96-well plate.

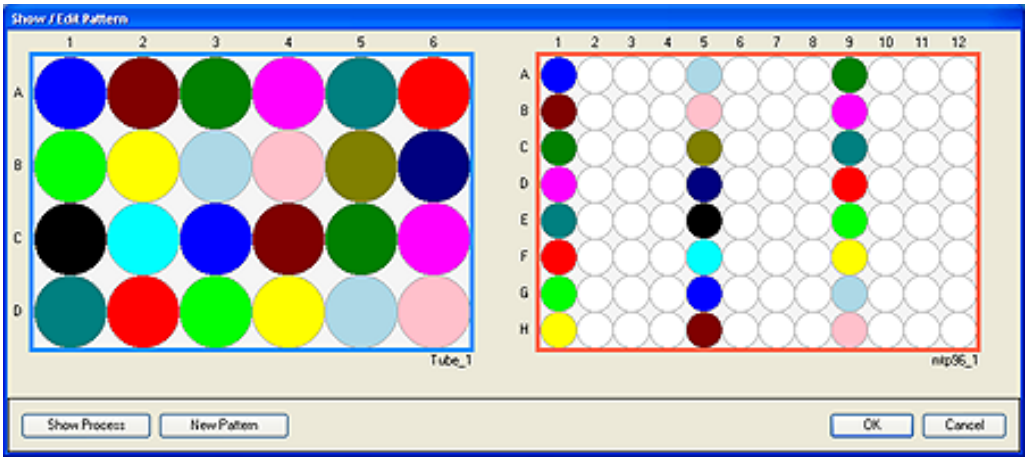
Work is performed first with a single-channel dispensing tool and then later, to speed up the process, with an eight-channel dispensing tool.

Method

First samples and then diluent should be transferred to the 96-well MTP. The dilutions are performed in the MTP 96.

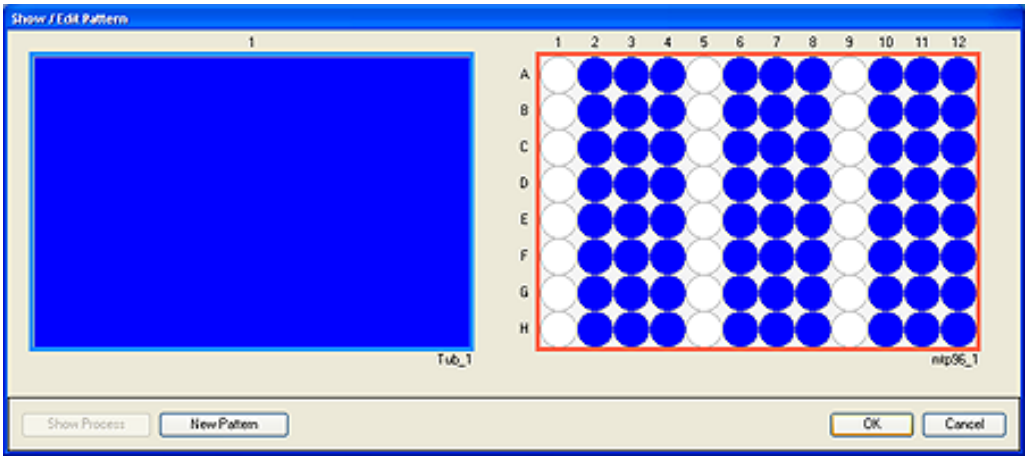
In the Sample Transfer command 200 µL of sample are respectively put in the micro test plate.

The pattern for the 24 samples in the destination tube looks as follows:



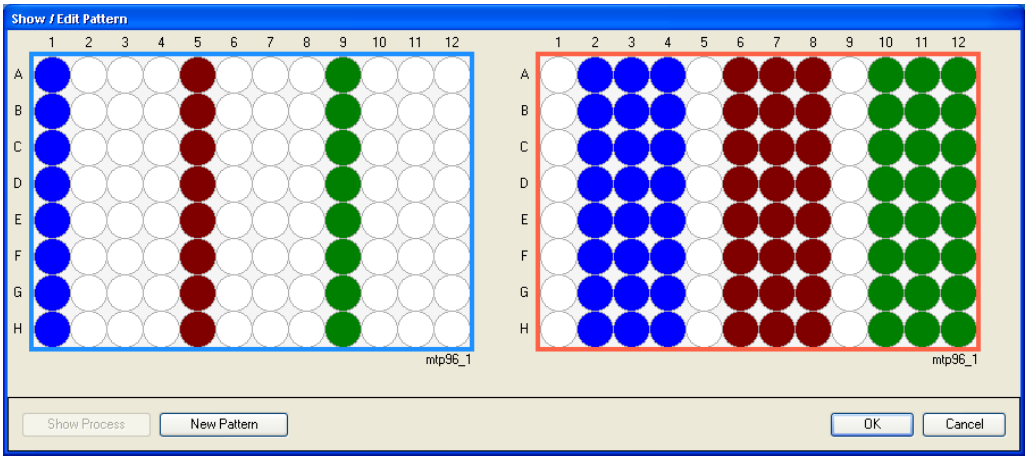
In the Reagent Transfer command the empty wells of the micro test plate are filled with 225 µL of diluent. From this point on, an eight-channel dispensing tool executes the task.

The pattern of the destination tube looks as follows:



In the Dilute command 25 µL of sample (A-1) is aspirated and mixed with the 225 µL of diluent (e.g., A-2). This is performed three consecutive times (A-3 and A-4). These three dilutions (1:10) lead to a 1:1000 dilution (MTP columns 4, 8 and 12).

Calling up Show Process in the Dilute command must show the following pattern for Dilute:

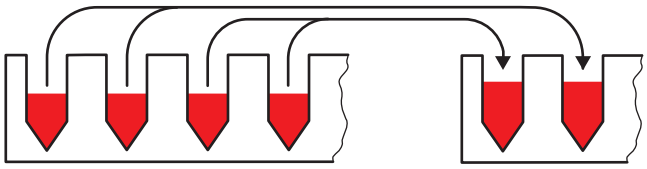


Each dilution step in this example is a 1:10 dilution. The desired dilution of 1:1000 is achieved by the third 1:10 dilution. The volume which is aspirated from the undiluted sample also applies to the dilution steps.

13.1.5 Pool

With the Pool command you combine liquids from several wells as well as different source tube locations.

Because with multiaspirate following each sample aspiration a drawing-up of the liquid in the tip occurs, the aspirated liquid segments are in the beginning separated by air bubbles. With a filled tip the content is dispensed into the destination tube. Which locations of the source are pooled for one location each of the destination tube is defined in the pattern.

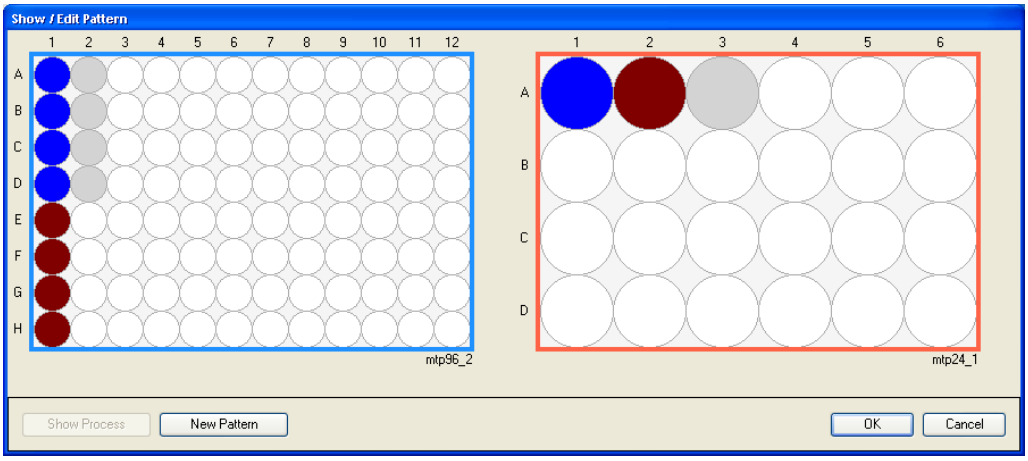


13.1.5.1 Define pattern

The pattern for the Pool command differs slightly from the pattern for other transfer commands. The following steps briefly describe the special features of the Pool command.

1. In the parameter window of the command click on the Pattern button.
2. In the pattern window click on the source locations from which the liquid is to be pooled in the desired order.
3. In the destination tube plate click on the location where the pooled liquid is to be dispensed.
4. In the source click on the next sequence of locations from where the liquid is to be pooled.

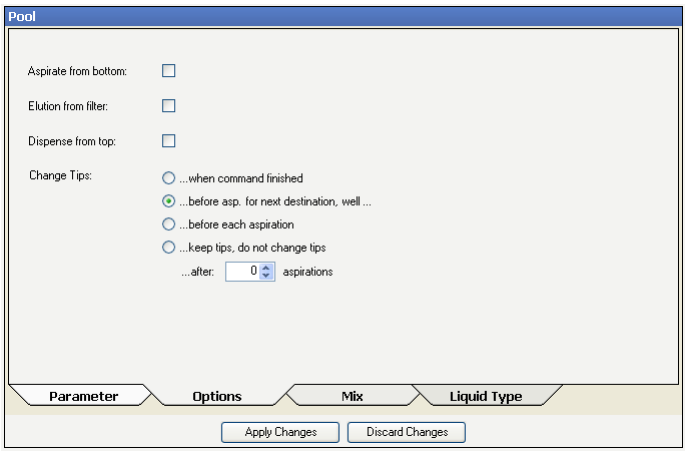
5. In the destination click on the next location where the pooled liquid is to be dispensed.



6. As soon as the pattern is identified, confirm with the OK key.

13.1.5.2 Options

Change Tips



Change tips ...

- .... before asp. for next destination, well ...

  Is the default setting. Tips are only changed when the next pool has been assembled for the next destination location.

All other entries and selection options are comparable to those of Sample Transfer.

13.1.5.3 Enter Number of Samples for Pool

The entry of the Number of Samples relates to the source tube. The number of samples divided by "Number of Samples per Destination" gives the number of destination locations. If a decimal place results from the division, the number is rounded up for destination locations. The pattern in the source is also executed completely for the last destination location. In the Pool pattern, a maximum of the samples occurring in a row or column can be pooled.

Example: the samples of each column of a 96-well plate are to be pooled in a destination plate. In other words, 8 samples are always put into a tube.

- Number of Samples entry at start: 48

  48 : 8 = 6

  6 destination tubes are filled.

- Number of Samples entry at start: 50

  50 : 8 = 6.25

  7 destination tubes are filled.

  The command is executed in the source up to location 56 inclusive (prerequisite: no limit in the **Number of Samples** command).

13.1.6 Pool One destination

With the PoolOneDest command you dispense the liquids from several source tube locations into **one** destination tube location.

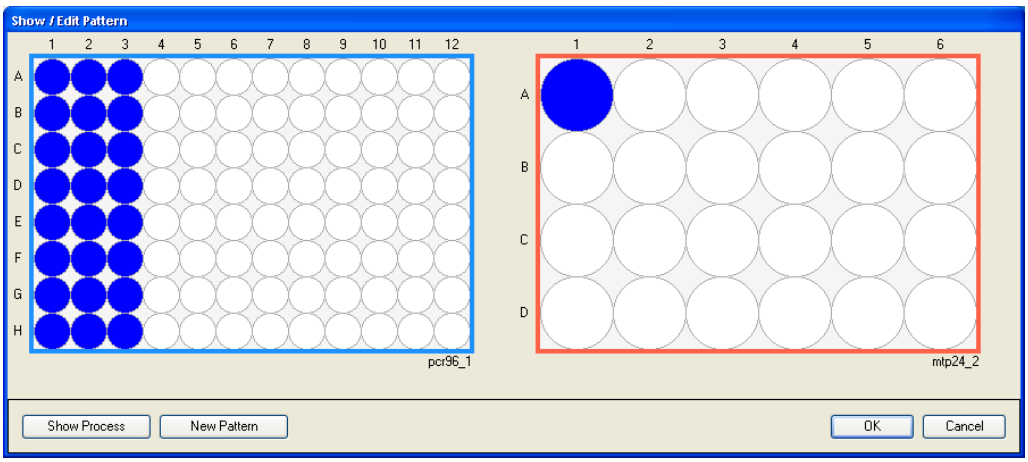
The Number of Samples entry determines the number of locations in which aspiration will be performed. There is only one location as destination tube.

With the multiaspirate transfer type, the liquid is drawn up in the tip following every dispensing step. The same criteria apply here as to the Pool command.

13.1.6.1 Define pattern

The pattern for the Pool One Destination command differs slightly from the pattern for other transfer commands. The following steps briefly describe the special features for the Pool One Destination command. In the pattern the locations are defined for the source tube where aspiration is to take place and the direction of the aspiration steps. Next the destination tube is only selected once.

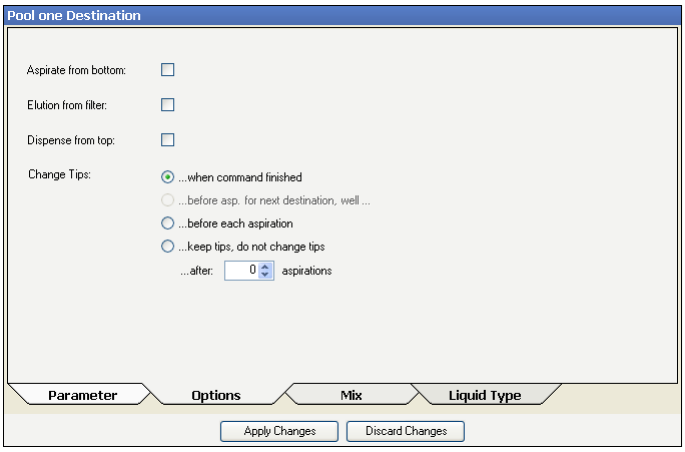
1. In the parameter window of the command click on the Pattern button.
2. In the pattern window click on the first and the second source tube location to define the direction for pooling the liquid.
3. In the destination tube plate click on the location where the pooled liquid is to be dispensed.



4. As soon as the pattern is identified, confirm with the OK key.

13.1.6.2 Options

Change Tips



Change tips ...

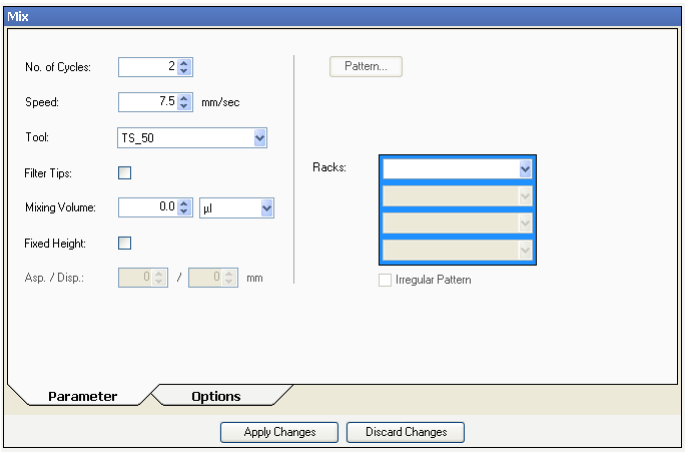
- ... when command is finished

  Is the default setting. The tips are not ejected until the command is finished.

All other settings are comparable with Sample Transfer.

13.1.7 Mix

Use this command to mix liquids within a location.



The complete mixing process takes place in the liquid. When the liquid is aspirated and dispensed, the dispensing tool is moved on accordingly in the z direction. A mixing cycle consists of an upward and a downward movement. The travel results from the selected volume.

Use only 50 µL tips for mixing in 384-well plates!

The descriptions of the mixing process for Sample Transfer (see *Mix on p. 219)* also apply to this stand-alone Mix command.

13.1.7.1 Recommended mixing speeds (Speed)

Enter the mixing speed in the Speed window. The speed range is between 0.2 and 110 mm/sec.

As long as there is no entry in the input field for Speed, this field always displays the aspiration speed of the selected liquid type. The speeds in the Liquid Type parameters are optimized for pipetting or multidispensing in combination with the selected dispensing tool and the selected volume.

Dispensing tool	Recommended lower volume range (mm/sec)	Recommended medium volume range (mm/sec)	Recommended high volume range (mm/sec)
TS 50	15 - 88	15 - 44	10 - 40
TM 50-8	15 - 88	15 - 44	10 - 40
TS 300	5 - 15	6 - 16	6 - 16
TM 300-8	2 - 11	2 - 11	2 - 11
TS 1000	4 - 15	4 -15	4 - 15
TM 1000-8	4 - 15	4 -15	4 - 15

The optimum mixing speed should be determined in trials. Increase mixing speed carefully during these trials. Use very high speeds only for correspondingly viscous solutions.

At very high speeds, large volumes and multiple mixing cycles, liquid may get into the dispensing tool (e.g., foam formation). In this case, perform method run tests using demineralized water. The use of filter tips will increase reliability.

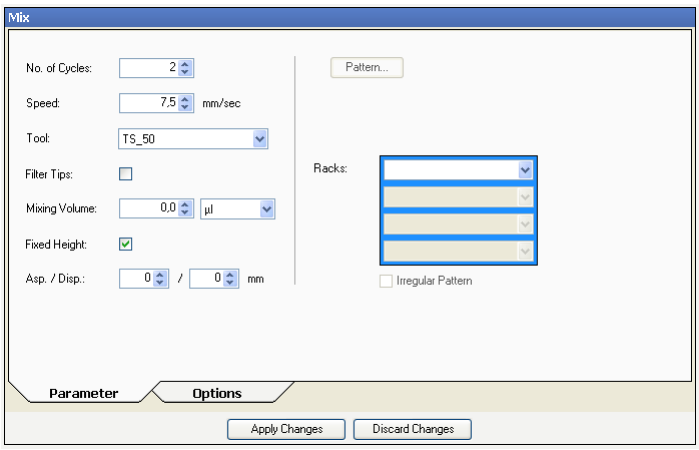
13.1.7.2 Mixing volume

The mixing volume must always be less than the current filling volume in the tube, as the remaining volume of the aspiration cannot be used for mixing.

You can have the remaining volume displayed in the Labware properties. In the case of very large tubes (e.g., 15 mL) larger remaining volumes result with the 50 µL and 300 µL tips in combination with the geometry of the dispensing tool than with the 1000 µL tips.

13.1.7.3 Mixing functions at Fixed Height

With Fixed Height a mixing process with a defined aspirating height and dispensing height can be determined.



Fixed Height should only be used for filling levels below the filling volume. At larger filling volumes, depending on the immersion depth selected, liquid may be forced out of the tube or well.

Enter the distance from the bottom of the tube in mm as the height.

Asp. stands for the distance of the pipette tip to the bottom of the tube when aspirating, Disp. stands for the distance of the pipette tip to the bottom of the tube when dispensing.

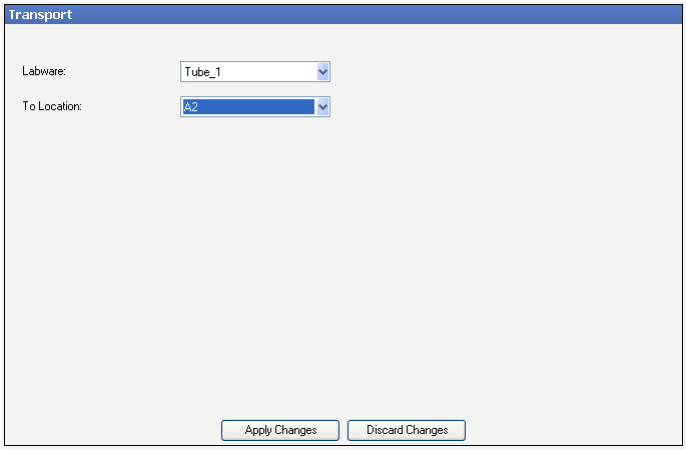
If you enter 0 mm in the Asp. field a correction of approx. ca. 2 mm upwards occurs after the execution. The correction depends on tube type and the tolerances of the tube type.

If you choose for Disp. a height which lies above the tube the dispensing is reduced automatically to the height of the tube.

If you select a height for Disp., which is below that of Asp., Disp. is raised to a height of Asp. on execution.

13.1.8 Transport

This command is used to transport labware from one location to another or to the Mastercycler (epMotion 5075 MC) or the vacuum unit (epMotion 5075 VAC) using the gripper.



In the parameter settings for the transport command, you select from lists the labware to be transported and the destination location.

The Vac Frame can be transported with a filter plate on it. Tips, racks, thermoadapters and height adapters cannot be transported. Semi-skirted and unskirted PCR plates can only be transported in the form of a thermoblock.

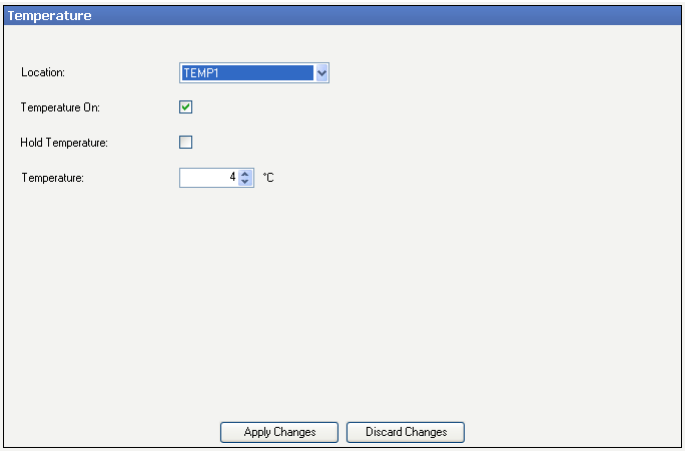
If the gripper is being used, location B0 may only be occupied by a

- 300 mL or 400 mL reservoir,
- CycleLock or
- Height Adapter

.

13.1.9 Temperature (only epMotion 5075 with thermal module)

The Temperature command is used to specify the temperature of a thermal module. The command can only be used on an epMotion equipped with thermal modules. If several thermal modules are available on the epMotion, you will have to make the appropriate selection. For temperature-control you can select a temperature between 0°C and 110°C. The current temperature of the thermal modules is displayed in the Functions tab.



1. From the Location list select the thermal module for which you want to set the temperature.
2. Then mark Temperature On.

If Temperature On is deactivated, the thermal module is not temperature controlled or a previously temperature-controlled thermal module is switched off.

If Hold Temperature is activated, the thermal module is also temperature-controlled outside a method. This function can also be used for pre-heating a thermal module for a subsequent method. You can switch off a thermal module being heated beyond a method with Hold Temperature by executing a temperature command with Temperature On.

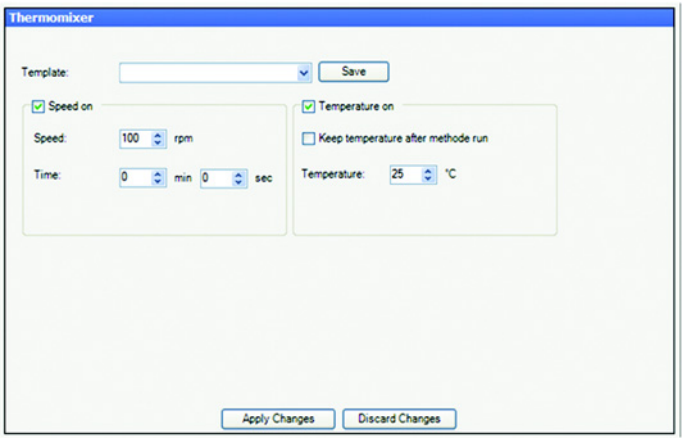
Temperature-control is switched off after shutdown.

13.1.10 Thermomixer (only epMotion 5075 with thermomixer)

With the Thermomixer command you can specify the mixing parameters and the temperature of the thermomixer. The command can only be used on an epMotion equipped with thermal modules. For mixing you can set a maximum rotational speed of 2000 rpm and a temperature of 4°C to 95°C can be set for temperature-control.

The lowest temperature reached by the thermomixer depends on the ambient temperature and can be a maximum 15°C below room temperature. With a room temperature of, for example 20°C, the lowest temperature reached by the thermomixer are 5°C.

Not the liquid level in your tube in relation to the desired rotational speed in order to avoid cross contamination and splashing of liquids. Do not mix with high rotational speed in combination with high liquid level.



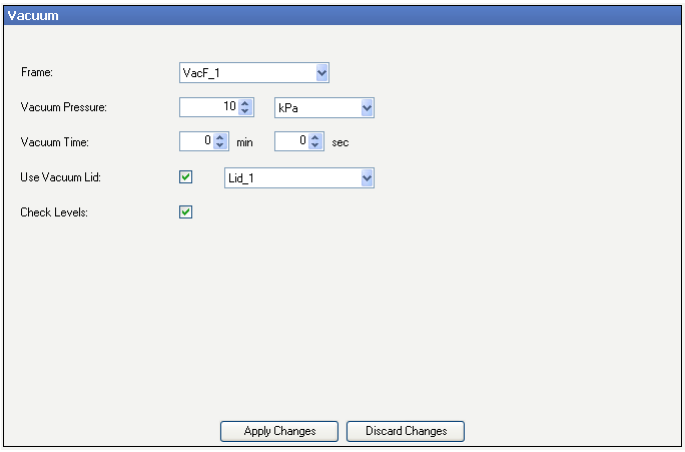
1. For some mixing tasks, optimized Templates are available which you can select from the list if necessary. This selection is optional. You can change the Templates as you wish and also use Save to create your own templates which then also are available for selection in the list. In the labware file window under TMX you can delete your own templates or deselect them in order to hide them in the list (see *Deleting a labware combination on p. 52)*.
2. Activate the Speed on function if you want to mix. Then you can enter the rotational speed (Speed) and the time (Time). You can enter a rotational speed between 300-2000 rpm and a time between 30 s and 120 min.
3. Activate the Temperature on function if you want to temperature-control the thermomixer. Then you can enter a Temperature between 4°C and 95°C.

If you want that the temperature is maintained during the method, activate the keep temperature after method run function. This function can also be used for preheating the thermomixers for a subsequent method. If the thermomixer is heated with keep temperature after method run beyond a method, you can switch it off by executing a thermomixer command with the function Temperature On disabled.

Temperature-control is switched off after shutdown.

13.1.11 Vacuum (only epMotion 5075 VAC)

This command can only be executed on the epMotion VAC.



Use the Vacuum command to set the vacuum in the vacuum unit. To enable you to define the parameters for the Vacuum command in full, a Vac Frame and a Vac Lid must have been defined for the worktable.

The required vacuum (maximum 850 mbar/85 kPa) is set using Vacuum Pressure. You can select between the units of pressure mbar and kPa.

The Vacuum Time can be up to 99 minutes and 59 seconds.

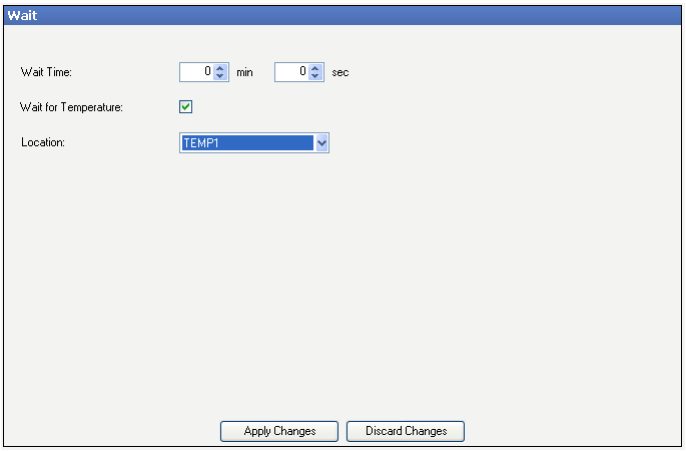
To transport the Vac Lid at the beginning of the command through the gripper from the location T0 to the filter plate in the vacuum unit activate Use Vacuum Lid . After the Vacuum time, at a residual vacuum of 100 mbar or 10 kPa, the Vac Lid is taken off again by the gripper and taken to location T0.

Check Levels causes the scanning of all wells of a filter plate to detect any remaining volume. In this case, apply a vacuum again if required. With plates, Check levels can take a relatively long time.

13.1.12 Wait

Use the Wait command to insert a pause in the method, e.g., to take account of temperature-control periods between two additions of reagent.

The duration of the pause is specified in the parameter settings.

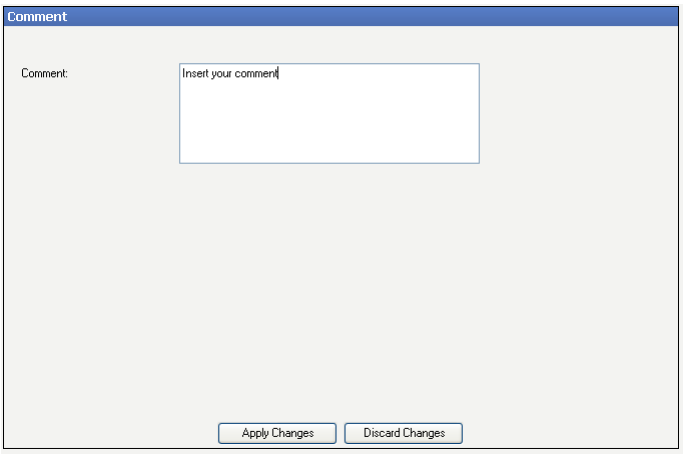


The following applies only to epMotion systems with thermal modules:

If Wait for Temperature is selected, a selection list appears from which the relevant thermal module (TEMP1 to TEMP3) can be selected. In addition, the following command is executed only once the specified temperature for the thermal module has been reached. The Wait Time only starts after the preset temperature has been reached on the defined thermal module.

13.1.13 Comment

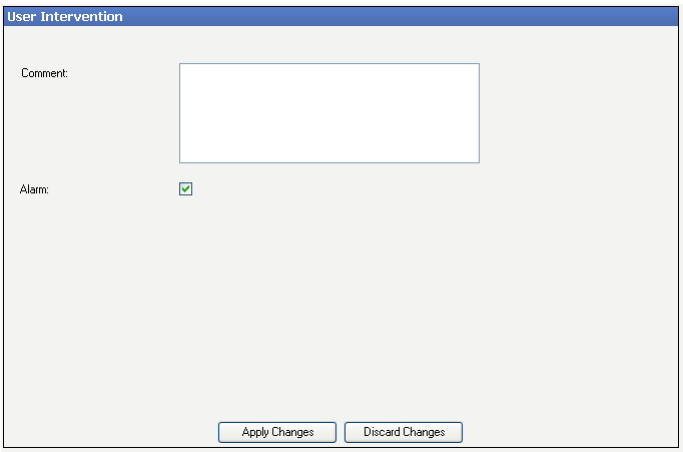
Use the Comment command to display a comment at a certain point during execution of the method.



The comment command entered is shown marked as a command line during the method run, no separate window is displayed.

13.1.14 User intervention

Use this command to interrupt a method, for example to perform manual steps.



If there is to be an alarm immediately before the manual intervention, mark the Alarm field.

Enter a corresponding comment on the intervention in the Comment field.

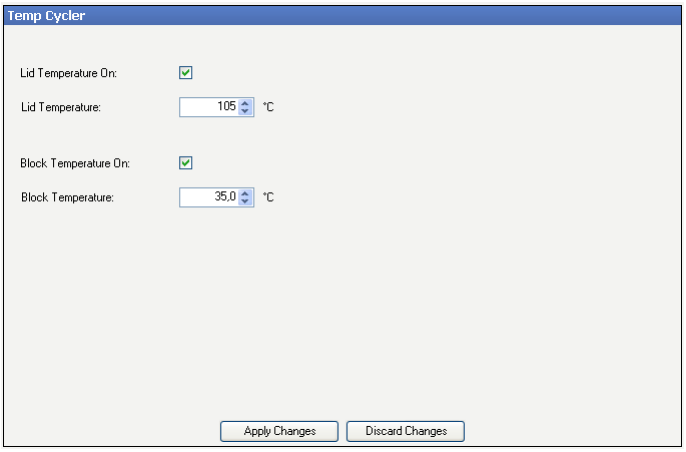
For methods with external steps which lead to a change in volume, divide these into 2 methods.

The following things must not happen at all with User Intervention:

- Change in position of carrier.
- Exchange of dispensing tools in locations T1 – T4.
- Positioning of labware which is not known to the method.
- Labware which is removed and then replaced may not be changed externally in terms of volume.
- Distance from labware required in the method. The waste container can be emptied in conjunction with this command. Then position the waste container correctly again.

13.1.15 TempCycler (only epMotion 5075 MC)

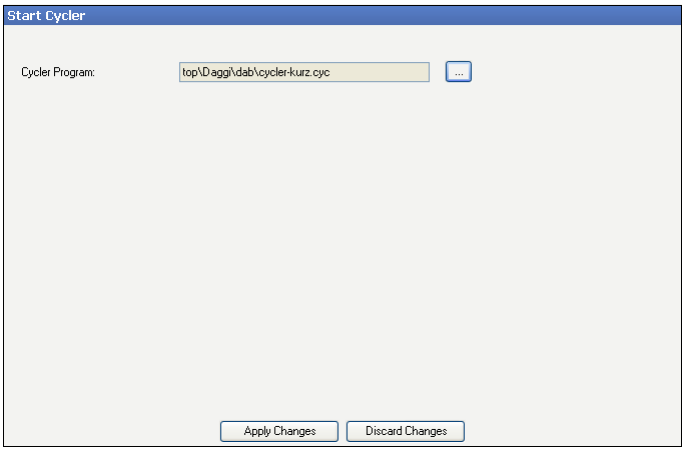
The command is only available on the epMotion 5075 MC with built-in Mastercycler ep.



With the TempCycler command the temperature of the cycler block and/or the cycler lid are controlled by a cycler program. To set temperature-control, open the parameters of the TempCycler command. Reckon on a time of approx. 3 minutes to heat up the cycler block and the ESP heated lid.

13.1.16 StartCycler (only epMotion 5075 MC)

Use the StartCycler command to select a cycler program and specify the start. This command must always be the last command of a method.



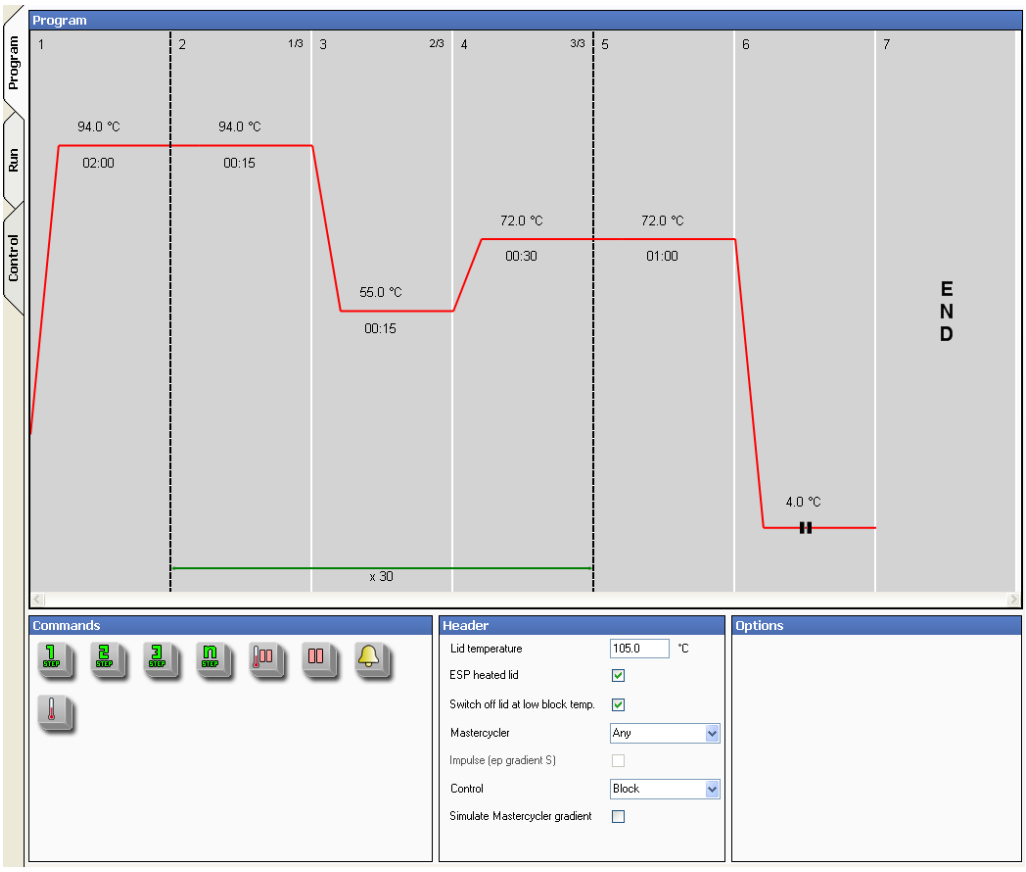
The cycler program can be selected via the button ... can be selected in the own user directory.

If the cycler is being operated **without** an epMotion, please note the following:

- If you work with simulated block control, after the start the number of samples and the filling volume are queried. You furthermore select between tube and plate.
- Cycler program without epMotion method: this is the only case in which you can use a semi-skirted or unskirted PCR plate.

To edit a cycler program,

- mark the cycler program in the application file window and then press **Open application**.



You can find detailed information on the Cycler program in the additional operating manual of the Mastercycler ep with epBlue.

13.2 Importing commands from a CSV file

When working with biological material (e.g., protein solutions, nucleic acid solutions), it may be necessary to transfer defined quantities of different samples from various parent solutions to a target container in order to adjust the concentration (thus creating standards). The quantities of sample material that must be transferred can be determined by physical measurements (e.g., by using spectroscopic methods, enzymatic analysis, or chemical methods), and the resulting quantities can then be listed in a table.

Using the menu function **Edit - Import from CSV** you can import a table in CSV format defining the volumes of sample material to be transferred from locations of a source tube to selected locations of a destination tube.

The imported table is converted into a sequence of Sample Transfer commands. With every imported Sample Transfer command the liquid of a specific source location is transferred to a specific destination location. The automatic pattern detection is not active for this command.

You can create and edit tables in CSV format using an editor or a spreadsheet. By importing a procedure from a file you can reuse the same sequence of commands in different methods by simply importing the sequence again from the same source file.

13.2.1 Creating a CSV file for import

A CSV file is an ASCII text file defining the structure and content of a table. Each line of text in the CSV file describes a row in the table. The content of the cells in each table row are separated by commas, semicolons or tab keys. You can create and edit a CSV with any simple ASCII text editor (e.g., Windows Notepad) or a spreadsheet (e.g., Microsoft Excel). The format of the CSV file has changed compared to epBlue Version 10.x.

If you use Microsoft Excel to create or edit a CSV file for import, make sure that the default separator for lists is not identical to the decimal point. I.e. in the Regional Settings for "English" in the Windows Control Panel the default separator for lists is a comma, so you cannot use the comma as a decimal point. Save your edited table in CSV format before exiting Excel (you do not need to save it also as an Excel file).

To create a CSV file make sure that the following prerequisites are met.

1. If you create your table in a spreadsheet and then export it to the CSV format make sure that the original spreadsheet file only contains one sheet, because only one sheet with table data can be exported to a CSV file.
2. Every Transfer command must be defined in a separate line. the values must be sorted as follows into 6 columns: "Rack" (Source rack), "Source" (Source location), "Rack" (Destination rack), "Destination" (Destination location), "Volume" (Transfer volume in µL), "Tool" (dispensing tool). The values in every line must be separated by commas, semicolons or tab keys. For decimal figures the decimal point or comma can be used. Make sure that the separator for lists is not identical to the decimal point.

   To illustrate the required file structure the first table rows of a CSV file are shown in the example below the way they appear in the spreadsheet:

	A	B	C	D	E	F
1	Rack	Source	Rack	Destination	Volume	Tool
2	1	a1	1	a1	2.0	1
3	1	a2	1	a5	2.8	1
4	1	b5	1	c6	4.0	1
5	1	c7	1	d6	4.1	1
6	1	c7	1	d7	4.2	1
7	1	c7	1	a6	4.3	1

   In comparison the same CSV file is shown here as it appears in an ASCII text editor:

```
Rack;Source;Rack;Destination;Volume;Tool
1;a1;1;a1;2.0;1
1;a2;1;a5;2.8;1
1;b5;1;c6;4.0;1
1;c7;1;d6;4.1;1
1;c7;1;d7;4.2;1
1;c7;1;a6;4.3;1
```

3. The values in the 6 rows of the CSV file must start in the second line of the file and then continue uninterrupted. No further entries must be made under these values because these would be interpreted as a command during import and cause errors.
4. If a line starts with “#”, it is interpreted as comment and not imported.
5. A maximum of 500 Transfer commands can be imported from a CSV file into a method.
6. The number of racks specified in the CSV file as source and definition locations must match the number of racks defined in the first Sample Transfer command added manually to the method prior to importing the file. A maximum of 4 source locations and 4 destination locations can be used on the worktable. The exact source and destination locations on each plate can be entered as figures (1, 2, 3, etc.) or as alphanumerical coordinates on the plate (A1, B5, A3, etc.)

7. The tool numbers in the CSV file must match the dispensing tools as follows:
   - 1 - TS_50
   - 2 - TS_300
   - 3 - TS_1000

   TM dispensing tools cannot be used. It is recommended to avoid frequent dispensing tool changes within a method.

13.2.2 Importing a CSV file

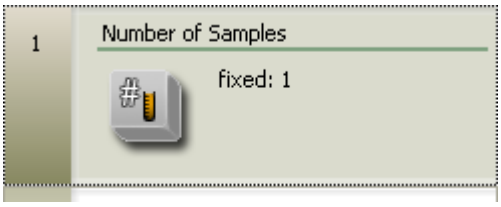
Proceed as follows to import a sequence of Sample Transfer commands from a CSV file.

Make sure that the CSV file meets the requirements for import.

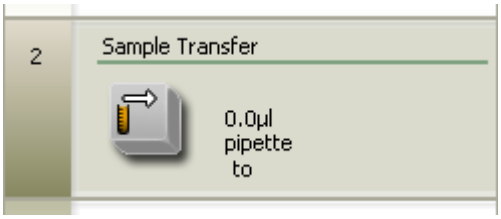
---

1. As a first step always add a Number of Samples command in a new procedure (see *Adding a command to the program on p. 65)*.
2. In the parameter area of the Number of Samples command, enable the "Fix number of samples" option and set the number of samples to 1.

   The number of samples is now limited for the following steps, so that every Sample Transfer command that follows is only executed once (i.e. for one sample).



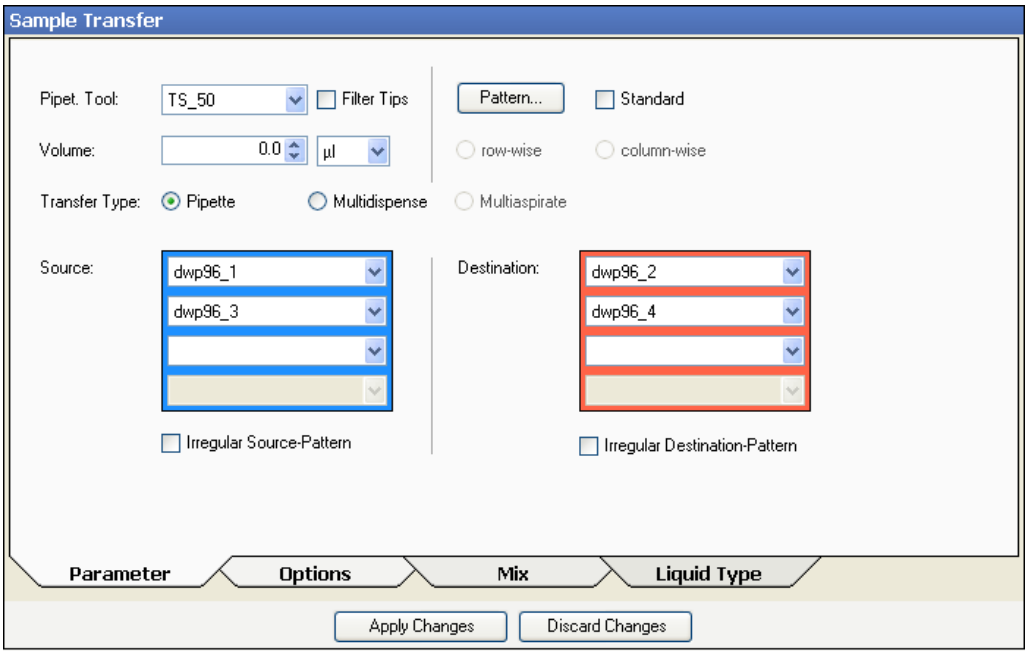
3. As a second step add a Sample Transfer command in the procedure (see *Adding a command to the program on p. 65)*.



   The first Sample Transfer command and its source and destination locations on the worktable serve as master configuration for the complete sequence of the commands imported from the CSV file. Only the source and destination locations defined manually in this first Sample Transfer command will be available during the sequence of the imported command.

4. Define the source and destination locations for the Sample Transfer command (see *Define the source tube (Source) and destination tube (Destination) for a transfer on p. 68)*.

The following example shows a Sample Transfer command with 2 source locations and 2 destination locations. These locations are available for the imported command sequence.



The number of racks specified in the CSV file as source and destination locations must match the number of racks defined with the first Sample Transfer command. A maximum of 4 source locations and 4 destination locations can be defined. The rack locations are then used in the order in which they appear in the parameter area of the first Sample Transfer command. I.e. if source rack 2 is specified in the file, the second rack in the list of source locations is used as source rack for the step.

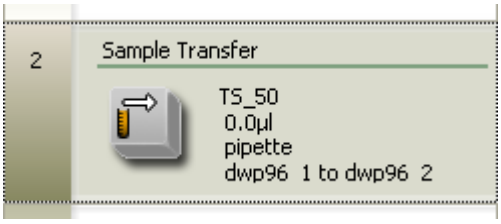
5. In the **Options** and **Mix** tabs in the parameter area of the Sample Transfer command define the options and mixing configurations you want to use for the sequence of the imported commands.

   The options and mixing configurations manually defined for the first Sample Transfer command are copied and used for all imported commands. The "Elution from filter" option is not available for imported commands.

6. Check the parameter settings for the first Sample Transfer command and ensure that they meet the requirements for the complete sequence of commands.

   Please pay particular attention to the mixing volume and the mixing speeds, because these settings must be suitable for all imported commands. The preset value for the mixing speed must be overwritten manually with a different value. If you want to use different dispensing tools (including TS_300), a mixing speed of 11 mm/sec is recommended.

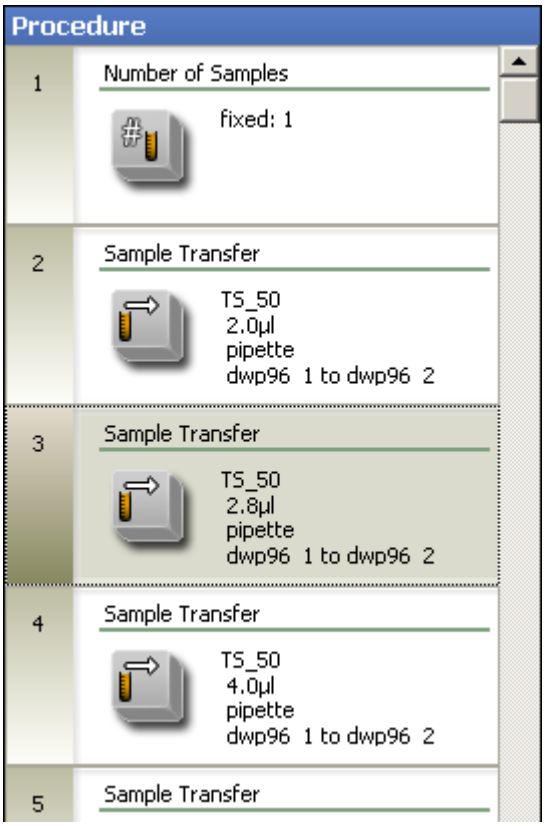
7. To import the command sequence from the file click on the Sample Transfer command in the program list to make sure it has been selected.



8. In the main menu select **Edit - Import from CSV**.

9. Select the CSV file you want to import and click on **Open**.

The CSV file is imported. Every line defined in the CSV file is added to the procedure as a Sample Transfer command with the settings defined in the file for source, destination, volume and tool. The imported command sequence is displayed in the program list.

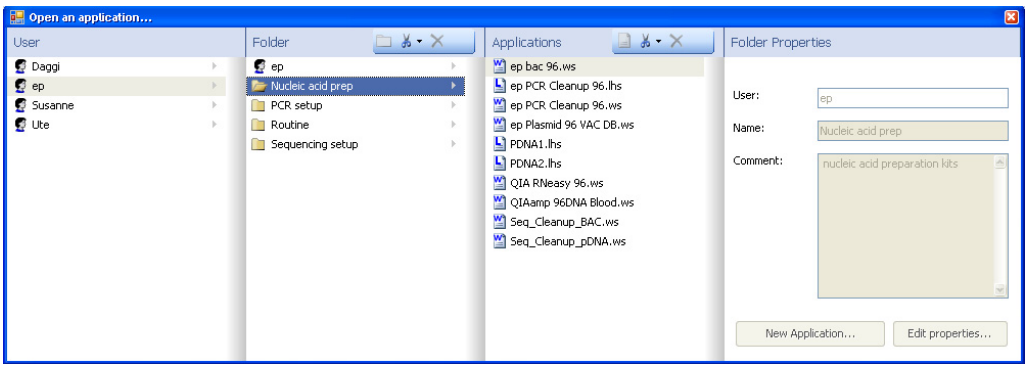


A maximum of 500 Transfer commands can be imported from a CSV file into a method.

13.3 Predefined methods

The User **ep** contains four subfolders with several applications for you to copy to your user directory where you can edit or start them.

Mehods contained in **ep** cannot be started or edited there directly.



This section provides you with an overview of the available applications and a short description.

More detailed information on the applications in the list below and for additional applications can be found under "Applications" at www.epmotion.com.

To better understand the descriptions you should display the contents of a method. Select the method and the information is displayed on the right-hand side of the screen.

13.3.1 Nucleic acid prep

QIA RNeasy 96	RNA isolation with the help of a Qiagen kit.
QIAamp 96 DNA Blood	DNA isolation in blood samples with the help of a Qiagen kit.
Promega_mag_96	Method for the automated DNA extraction with the "Promega Wizard Magnetic 96 DNA Plant System".

13.3.2 PCR setup

Modular rack A	Method for filling a PCR plate with 8 different DNA samples and 12 different primer pairs from a full reservoir rack.

13.3.3 Routine

10 ml tubes to plate	Uses a 16 mm rack with 10 mL tubes (tubes with conical bottom and screw cap) to fill four rows of a 96er twin.tec PCR plate in turn.
384 to 4x96	Sample transfer of a 384 well plate to four 96 well plates. Design with eight channel dispensing tool.
4x24 to 96	Sample transfer of four thermoracks to a 96 well PCR plate.
4x96 to 384	Sample transfer of four 96well plates to one 384 well plate.
96 to 4x24	Sample transfer of a 96 well plate to four thermoracks. Design with single channel dispensing tool.
Admirable results	Filling of two Deepwell plates 2.2 mL with 1000 µL per well. Sampling from four 100 mL reservoirs.
Dilute 1to10 – 1to1000	Executing a diluting series using the **Dilute** command. By way of reagent transfer diluent is transfered to a 96 well plate. By way of sample transfer samples are then transfered from a 24 well rack into the still empty columns of the plate in front of the already dispensed diluent. The transfered undiluted sample is then diluted in three stages (**Dilute** command).
Disperse from 1 to 2	Using Sample Transfer a transfer is made from a 96 well plate to two 96 well PCR plates. An eight channel dispensing tool is used. Each sample is dispensed with the same tip to two different plates. The tip is changed prior to sampling a new sample.
Fill 24	Simple fast method for filling a 24 well thermorack with 1000 µL liquid pro Safe Lock tube. Sampling from a 30 mL reservoir.
Fill 384	Simple fast filling of a 384 well twin.tec PCR plate with 20 µL water per well using the dispensing tool TM 50-8. Dispensing is carried out as multi-dispensing. Sampling from a 30 mL reservoir. The method is recommended for checking the dispensing precision. It is highly recommended to also dispense and evaluate using the dispensing version "pipette".
Fill 96	Simple fast filling of a 96 well twin.tec PCR plate with 100 µL water per well using the dispensing tool TM 300-8. Dispensing is carried out as multi-dispensing. Sampling from a 30 mL reservoir. The method is recommended for checking the dispensing precision. It is highly recommended to also dispense and evaluate using the dispensing version "pipette".

LI384_1	Method fills a 384 well plate with different solutions in a "checkered" pattern using a single channel dispensing tool. The method and in particular the pattern shown can thus be used as the basis for independent contamination checks Modification of volume, plate, liquid type etc. is recommended for the actual task.
LI384_8	Similar to LI384_1 but using an eight channel dispensing tool. The checkered pattern results from the fact that the eight channel dispensing tool can only fill every second well of a 384 well plate. The method and in particular the pattern shown can thus also be used as the basis for independent contamination checks Modification of volume, plate, liquid type etc. is recommended for the actual task.
Modular rack B	Filling of two 24 well platds with 1,800 µL liquid A and 2,000 2.000 µL liquid B from a reservoir rack equipped with modular rackes with 50 mL and 15 mL tubes.
Pattern1	Filling every second column of a 96 well plate using the dispensing tool TM 300-8. Filling the columns using a reagent transfer. Reagent sampling from a 30 mL reservoir.
Pool	Using the Pool command 4 adjacent wells in a column of a 96 well plate are combined ("aspirate") and transfered into a Safe Lock tube in a thermorack.
PoolOneDestination	Collecting the content of a 96 well plate in a 300 mL reservoir.
Stack	Example for stacking plates in a method with greater throughput.

13.3.4 Sequencing setup

ABI 384	For preparation of the mastermixe see method properties. The method can be executed with every epMotion The method dispenses mastermix and templates in a 384well twin.tec PCR plate.
ABI 96	For preparation of the mastermixe see method properties. The method can be executed with every epMotion The method dispenses mastermix and templates in a 96well twin.tec PCR plate.
Amersham 384	The method dispenses mastermix and template to max. 384 locations of a twin.tec PCR plate.
Amersham 96	The method dispenses mastermix and template to max. 96 locations of a twin.tec PCR plate.

14 Appendix C: BIOS password

14.1 Changing the BIOS password

To prevent unauthorized access to the BIOS setup a password can be set up:

1. Switch on the PC.
2. As soon as the BIOS starts press "F2" to open the setup.
3. Use the cursor to go to "security".
4. Use the cursor to go to "set supervisor password" and press Enter.
   The password field opens.
5. Enter and confirm a password.
6. Press F10 to save and exit the BIOS setup.

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