epMotion® 5070

Operating Manual

eppendorf

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Which document do you refer to? Product: _____ Document ID: _____ (found on the second or last page of the manual, e.g. MixMate / B 5353 900.015-01/0506)	
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7) Remarks and suggestions (e.g. missing or too much content) as well as statements, particularly for critical ratings in 1) to 6).	
Job title:	E-Mail: (for possible further inquiries only)

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1 User instructions — Using this manual

1.1 Using this manual

- Before using the epMotion 5070 for the first time, please read the operating manual.
- Please view this manual as part of the product and keep it somewhere easily accessible.
- If you lose the operating manual, request a replacement. The current version of the operating manual can be found on our website, www.eppendorf.com.

1.2 Warning signs and hazard icons

Representation	Meaning
	**DANGER** Risk of electric shock with potential for severe injury or death as a consequence.
	**DANGER** Risk of explosion with potential for severe injury or death as a consequence.
	**DANGER** Biohazard with potential for risk to health or death as a consequence.
	**WARNING** Warning of potential injury.
CAUTION	Refers to slight risk or risk of material damage.
	**NOTE** Refers to particularly useful information and tips.

1.3 Symbols used

Symbol	Meaning
▸	You are requested to perform an action.
1. 2.	Perform these actions in the sequence described.
•	List.
Text	Terms and names of keys from the software.

1 User instructions

1.4 Abbreviations used

DWP	Deepwell plate
epT.I.P.S.	**ep**pendorf **T**otally **I**ntegrated **P**ipetting **S**ystem
MMC™	MultiMediaCard™
MTP	Microplate
PCR	Polymerase Chain Reaction

1.5 Glossary

A

Administrator User with special rights. Configuration settings and some system settings are reserved primarily for the administrator. The administrator has a special PIN for logging on.

C

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

Comment This command allows you to enter a comment line.

Control panel Control panel, control unit including display, keyboard, mouse and MultiMediaCard™ for operating the epMotion.

D

Dilute The Dilute command is a modified Sample transfer 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 This command allows you to exchange two labware items on the worktable manually.

F

Filling Volume 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 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 Collective term for racks, plates, tips etc. which can be positioned on the worktable. The specification as to which labware can be used is made by the administrator by means of the appropriate selection from the labware present in the software. The latest labware version can be viewed on the homepage www.epMotion.com.

Location Position for a plate, tips or a rack on the worktable. 4 locations are available on the worktable of the epMotion. In addition, 3 parking positions are displayed on the worktable.

Login and Logout Logging in and logging out on the control panel; only one user can ever be logged on at one time.

1 User instructions Glossary

M

Method Stored sequence for supplying the surface (worktable) at the start of the method and the procedures required for the epMotion in each case.

Mix This command allows you to mix liquids in a tube.

MMC™ MultiMediaCard™; storage medium or memory card. Used to transfer data to or from a PC using Windows 98® or higher. The data on the PC is read in by a USB card reader. The USB card reader is included in the delivery package.

Module racks The module racks which can be temperature-controlled can be supplied with tubes of different designs. The position of the tubes in the Module Racks can be adjusted to five different heights using an adjusting pin. Up to seven Module Racks can be positioned in a Reservoir Rack.

N

Number of Samples Command used to specify how many samples are to be processed in the subsequent steps of a procedure.

P

Pattern Distribution pattern; specifies aspiration and dispensing positions within a dispensing command. Patterns can be defined with automatic pattern detection, as simple standard patterns or as irregular patterns. Patterns are direction-independent in the x and y direction (e.g. from left to right or from right to left).

PCR clean Pipette tips, PCR plates, tubes etc. from Eppendorf AG with the following product properties: free of human DNA and PCR inhibitors, free of DNase and RNase, no PCR inhibitors.

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

Pool One Destination This command is used to transfer liquids from several source positions to one destination position.

Procedure List of commands in chronological order of execution.

R

Rack Holder for tubes or pipette tips.

Reagent Transfer Command for transferring a liquid from one source to one or more positions of a destination.

Reservoir The 30 mL and 100 mL reservoirs (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 Command for transferring several liquids from various positions of one source to several positions of a destination.

Source and Destination Source and destination tube. In the"Sample Transfer" or "Reagent Transfer" commands, either a source (aspiration position) or destination (dispensing position) is selected from a location occupied by labware.

T

Thermoadapter The thermoadapter is used to hold a plate (depending on whether it is a PCR or DWP thermoadapter). Thermoadapters can be passively temperature-controlled. Thermoadapters and a plate are not a fixed combination.

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

1 User instructions

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Thermorack Rack with a metal body. For smaller tubes (e.g. Eppendorf Safe-Lock tubes for 0.5 mL, 1.5 mL or 2 mL) a thermorack with a lid rack with 24 positions which can be tempered 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 provided ready-packed in PP racks.

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

Tubes Individual tubes inserted in a rack.

U

User Intervention Use this command to insert steps in your method which the user has to execute manually.

W

Wait Use this command to select a pause before the next command.

Working volume Recommended working volume. Liquid can be dispensed into a tube or well up to the working volume with very little contamination using a variety of liquid types.

Worktable Graphical display of the supply of tips, racks, plates etc. on the surface at the start of a method. If labware is stacked in a location (for example Height Adapter and MTP), the stacks are marked accordingly in the worktable display.

2 Product description Main illustration

2.1 Main illustration

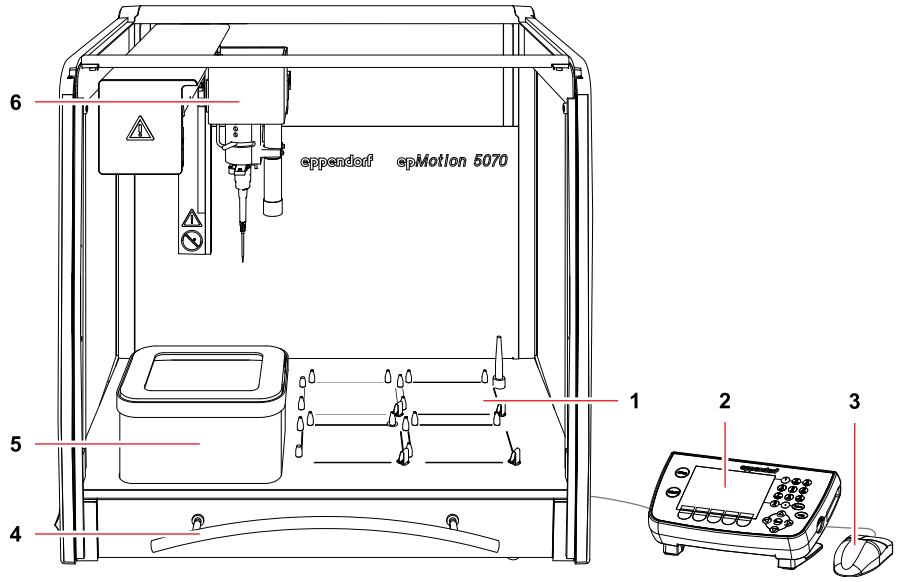


Fig. 1: Front view of the epMotion 5070

1 Worktable	2 Control panel
3 Mouse	4 Front hood
5 Waste container	6 Carrier

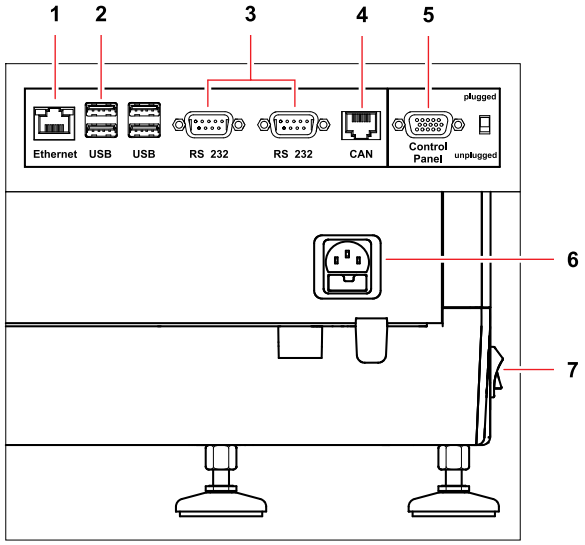


Fig. 2: Section of the rear view of the epMotion 5070

1 Ethernet	2 USB
3 RS 232	4 CAN OUT
5 Control panel	6 Mains power supply
7 Mains switch	

Only connect devices to the interfaces that meet the IEC 950/EN 60950 (UL 1950) standards.

2 Product description Delivery package

2.2 Delivery package

Quantity	Order No. (International)	Order No. (North America)	Description
1 or	**5070 000.000** **5070 000.018**	**960000005**	**Automated pipetting system epMotion 5070** Basic device, includes control panel, software, Optical Sensor, waste container, MMC and reader, operating manual 200-240 V, 50/60 Hz, power plug Europe 100-130 V, 50/60 Hz, power plug Japan, ROW
1	**5346 000.017**		**Control panel for epMotion**
1	**5075 782.006**		**Cable mouse**
1	**5075 780.003**	**960002008**	**MultiMediaCard 16 MB**
1	**5075 753.006**	**960002016**	**Waste container**
1	**- .**	**-**	**Optical sensor**
1	**- .**	**-**	**Mains cable to suit country of order origin or destination**
1	**5070 900.140**		**Operating Manual**
1	**- .**	**-**	**Tool for securing device during transport**

A detailed overview of the accessories and of the article numbers can be found separately (see *Accessory* on page 101).

2.3 Features

The epMotion 5070 enables you to perform dispensing operations automatically. There is a control panel for controlling the epMotion 5070.

The epMotion 5070 can be supplied with a variety of dispensing tools which are inserted manually. 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.

From device version 4.337 onwards either a control pad or a PC can be connected to the epMotion without requiring any further update. A simultaneous connection of both control elements is impossible.

2.3.1 Principle

The liquid is aspirated in pipette tips in the source position, transported and dispensed at the destination position.

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 position and destination position as well as the desired dispensing or transport pattern.

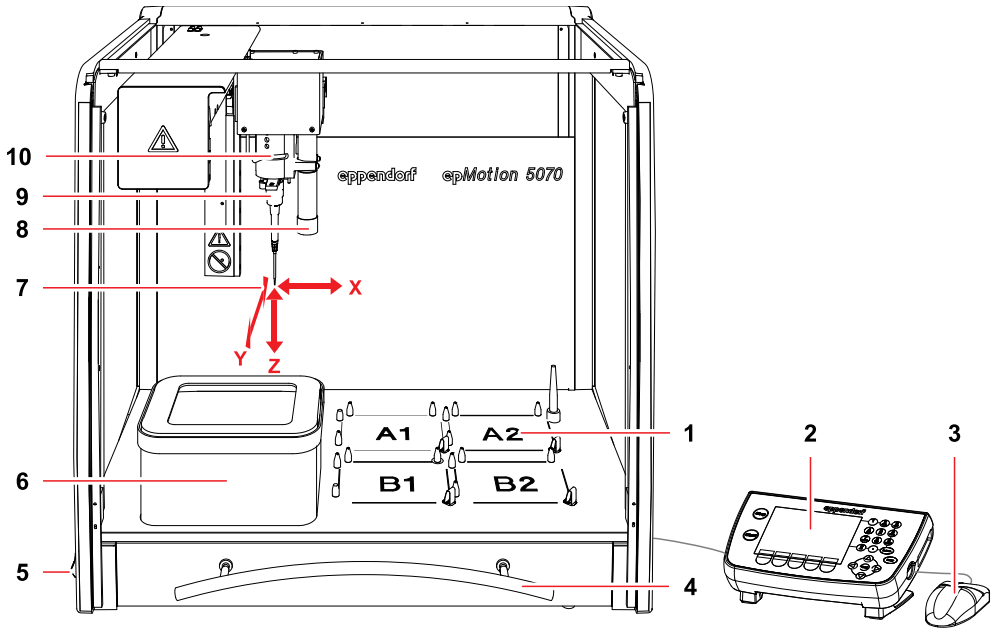
For further information, go to www.epMotion.com

2 Product description Overview of hardware and labware

2.4 Overview of hardware and labware

Familiarize yourself with the epMotion 5070 and the labware before using them for the first time.

2.4.1 Hardware



1 Locations Positions A1, A2, B1 and B2 for labware.	**2 Control panel**
3 Mouse	**4 Front hood** Can be pushed up to open the inner space.
5 Mains switch For switching on and off.	**6 Waste container (standard)** The waste container can be autoclaved; can be washed in a dishwasher.
7 Directions of movement of the carrier	**8 Optical sensor**
9 Dispensing tool	**10 Carrier**

2 Product description Overview of hardware and labware

2.4.1.1 Dispensing tools (Tools)

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

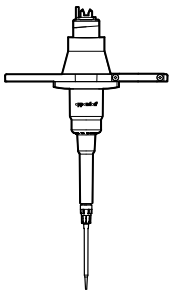


Fig. 3: Single-channel dispensing tool

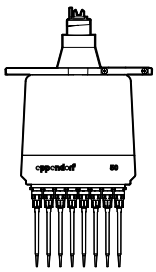


Fig. 4: Eight-channel dispensing tool

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	

2.4.1.2 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 5070:

- 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 liquids (Liquid Detection) in reservoirs, tubes, and plates.

Liquid Detection and Location detection can be performed for a labware height up to 107 mm.

Caution! Faulty liquid detection due to air bubbles.

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

1. Before the start of a method, ensure that there are no air bubbles in tubes or wells.
2. 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 Product description Overview of hardware and labware

2.4.1.3 Control Panel

The control panel is for controlling the epMotion 5070. This is where you log on to select and start methods. You can also create and edit your own methods here, as well as administer and back up method data.

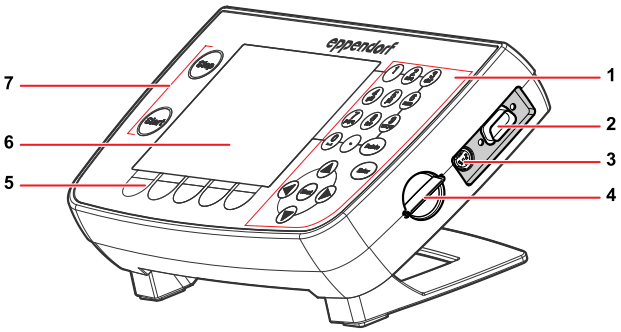


Fig. 5: Control panel

1 Keyboard For entering data and editing methods	**2 Interface for Service**
3 Mouse port	**4 Slot for MultiMediaCard (MMC™)**
5 Function keys	**6 LCD graphical display** Format 1/4 color VGA with background lighting.
7 Start and Stop keys	

The control panel is connected to the rear of the epMotion. The control panel is supplied with power via the connection on the epMotion. Data are also exchanged between the control panel and the epMotion via this connection.

2.4.1.4 MultiMediaCard (MMC™)

The MultiMediaCard (MMC™) is for backups. When you perform a backup of the data on the control panel, the program version and all labware specifications, including liquid types and applications in the epMotion 5070 memory, are copied to the MMC™.

Other functions of the MMC™ are Update and Transfer log files, together with Restore data.

Fig. 6: Front of the MultiMediaCard (MMC™)

Fig. 7: Gold contacts on the rear of the MultiMediaCard (MMC™)

If you create and edit methods on the PC, the MMC™ also serves for exchanging data between the control panel of the epMotion 5070 and the PC. The PC then has to be equipped with a USB card reader or a drive for MMC™ and the epMotion Editor software must be installed.

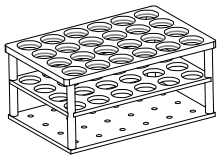
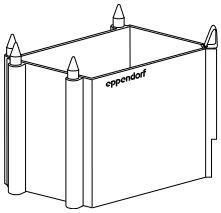
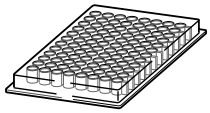
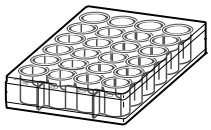
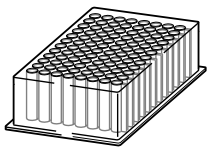
2 Product description Overview of hardware and labware

2.4.1.5 Waste system

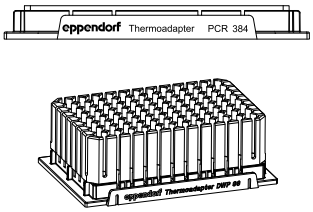
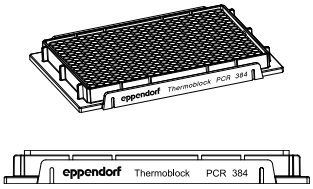
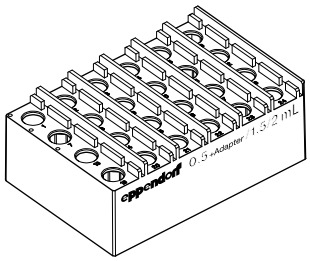
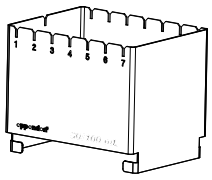
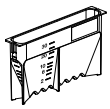
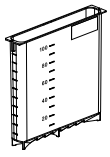
The standard waste container can hold approx. 400 individually-ejected 1000 µL tips or correspondingly more of smaller tip sizes.

2.4.2 Labware

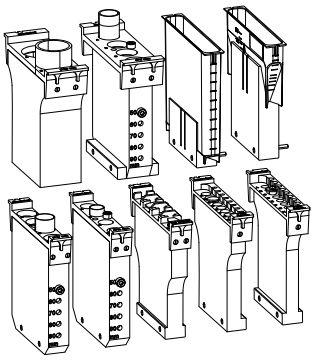
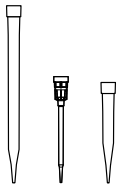
The following list gives you an overview of the labware of the epMotion 5070. More information on available labware components can be found in the appendix (see *Labware* on page 106) as well as in the Internet www.epMotion.com.

Labware	Description	Labware folder/ more information
Tubes	You can use different tubes on the epMotion 5070 by equipping 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. You can position tubes higher with the aid of a spacer.	**Equip Racks + Modules with Tubes** (see *Racks for reagent reservoir* on page 108)
Height Adapter 	To keep carrier travel times and distances as short as possible, there are various Height Adapters (height 40, 55 and 85 mm) which you can use to compensate for different heights of plates.	**Adapters** (see *Height adapter* on page 117)
Plates   	You can use different plates on the epMotion 5070: • Microplates (MTP) with 6, 24, 48, 96 or 384 wells • Deepwell plates (DWP) with 24, 96 or 384 wells • PCR plates (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 page 119)

2 Product description Overview of hardware and labware

Labware	Description	Labware folder/ more information
Thermoadapter 	The PCR thermoadapter is for temperature-controlling 96-well and 384-well PCR plates. However it does not form a fixed combination with a plate. The DWP/1 thermoadapter is used for temperature-controlling 96-well and 384-well PCR plates. However it does not form a fixed combination with a plate.	**Adapters** (see *Thermoadapter* on page 111)
Thermoblock 	The thermoblock is 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 page 111)
Thermoracks 	The thermorack with lid holder and 24 positions which can be tempered is for tempering smaller tubes (e.g. Eppendorf Safe-Lock tubes for 0.5 mL, 1.5 mL or 2 mL).	**Equip Racks + Modules with Tubes** (see *Thermoracks* on page 110)
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 page 112)
Reservoirs (tubs) 	For the supply of liquids use reservoirs with the sizes of 30 mL and 100 mL. The reservoir rack carries up to seven reservoirs.	**Equip Holder with Tubs + Modules** (see *Reservoirs and reservoir-rack* on page 112)
	For larger volumes, two autoclavable reservoirs with a capacity of 300 mL and 400 mL are available.	**Tubs**

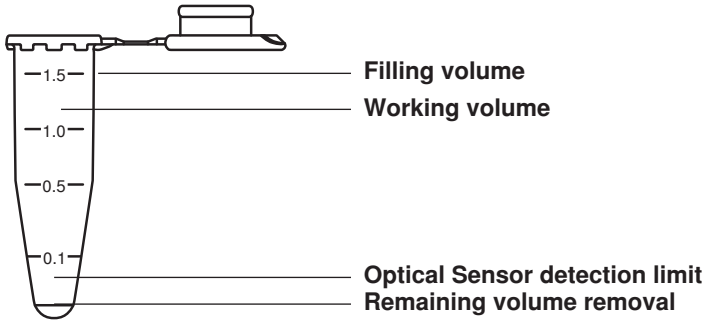
2 Product description Overview of hardware and labware

Labware	Description	Labware folder/ more information
Module racks 	TC reservoir rack modules (temperature-controlled) are supplied 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 page 113)
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.	**Tips** (see *epT.I.P.S. Motion* on page 107)

2 Product description Overview of hardware and labware

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

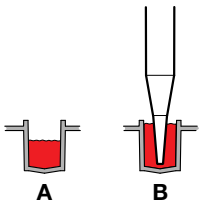
Maximum filling volume for a tube or well. A much larger volume is rejected by the software with an error message.

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 to be recommendations.

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

2.4.3.2.1 MTP 96/384, PCR 96/384: liquid displacement in working volume



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

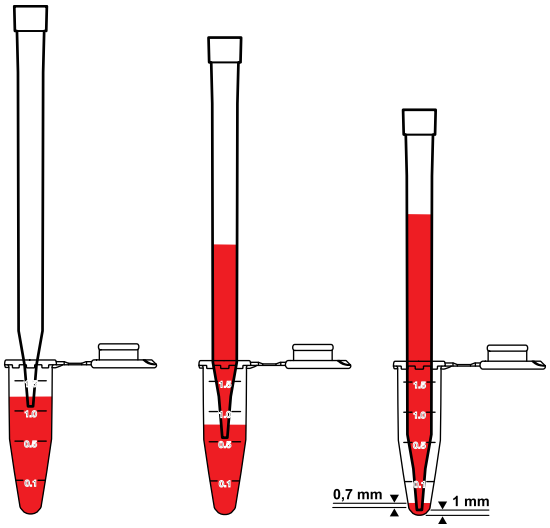
When immersing tips in filled wells of 96-well and 384-well plates, volume displacement can cause the liquid to overflow if the optical sensor is switched off. You can avoid this by not exceeding the working volume in the wells.

To display the filling volume, mark the labware and press the **Prop.** function key.

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 this, select the relevant option in a command (Sample Transfer, Reagent Transfer) **Aspirate from Bottom** (see *Immersion depth and dispensing height (special)* on page 144).

2 Product description Overview of hardware and labware

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. Under standard conditions, the immersion depth of pipette tips is reduced at the bottom of the tube from 3 mm to 0.7 mm. Under standard conditions, remaining volume is accordingly calculated from a filling level of 1.7 mm.

2.4.3.3.1 Remaining volume special cases

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.

2.4.3.3.2 Changing remaining volume

Under standard conditions, the smallest distance between pipette tip and the bottom of the tube 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 *Set Bottom Tolerance* on page 160).

2.4.3.4 Multidispense

2.4.3.4.1 Reverse stroke with multidispense

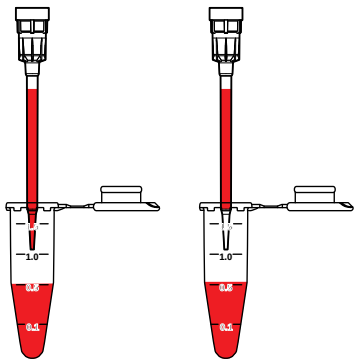


Fig. 8: Multidispense Before and After Reverse Stroke

In Multidispense, a reverse stroke takes place after aspiration of the liquid. In this process, aspirated liquid is returned to the source. The volume of the reverse stroke is part of the aspiration volume and of the required volume in the source. 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 page 99).

2.4.3.4.2 Extra aspiration with multidispense

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 tip change: the extra aspiration is returned to the source if **no** tip change is specified before each aspiration of liquid. 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

2.4.3.4.3 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 present in the source:

- 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.

2.4.3.4.4 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 automatically increases the sum by the remaining volume which cannot be aspirated from the source. 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.

2.4.3.5 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.

2.4.3.6 Volume check

Knowledge of the software and of use of the control panel is required to perform the volume check. (see *Overview of operation with the control panel* on page 31) .

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.

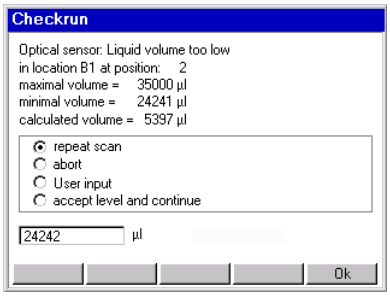
Perform the following check.

1. From the **ep** node and the **Routine** folder copy the method **Fill 96** 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.

2.4.3.7 Volume correction following error message from optical sensor

Knowledge of the software and of use of the control panel is required to perform the volume correction (see *Overview of operation with the control panel* on page 31) .

If the optical sensor detects too high or too low a 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**.

Caution! 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 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 *Special case: use of several sources* on page 147).

3 Safety

3.1 Intended use

This product is subject to the Directive 98/79/EC of the European Parliament and the Council ("the Directive") on in vitro diagnostic medical devices.

This device is an accessory compliant with the Directive intended by Eppendorf specifically to be used together with an in vitro diagnostic medical device to enable such device to be used in accordance with its intended purpose. Further information on its intended purpose can be derived in the product manual and other instructions and from promotional materials of the respective IVD product.

Furthermore, 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.

The epMotion 5070 implements automated reproducible dispensing operations such as pipetting and dispensing. The autoclavable dispensing tools work in a volume range from 1 µL to 1000 µL.

The epMotion 5070 meets the relevant fundamental requirements of the EC directives and standards listed in the declaration of conformity.

The epMotion 5070is to be operated only by qualified staff for professional use.

3.2 Warnings for intended use

Read the operating manual first and follow the general safety notes below before using the epMotion 5070 .

Danger! 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 the device to be opened by anyone except service personnel who have been specifically authorized by Eppendorf.

Danger! Electric shock.

- Switch off the device and disconnect the power plug before opening the device, performing work on electrical connections or starting maintenance or cleaning work.

Danger! Electric shock from damage to device/power cable.

- Only switch on the device if the device and the power cable are undamaged.
- Only use devices that have been properly installed or repaired.

Risk of explosion!

- Do not operate the device in rooms where work is being carried out with explosive substances.
- Do not use this device to process any explosive, radioactive or highly reactive substances.
- Do not use this device to process any substances, which could create an explosive atmosphere.

3 Safety — Warnings for intended use

Danger! Damage to health from biologically or chemically hazardous substances.

Hazardous chemicals cause burns and other health hazards.

- Observe the material safety data sheets for the biological and chemical substances used.
- Wear personal protective equipment (PPE) at all times when working with biological or chemical substances.
- Follow the instructions for cleaning and decontamination, and ensure that hygiene safety standards are maintained.

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! Damage due to incorrect power supply.

- Only connect the device to power sources that match the electrical specifications on the device ID plate.
- Use only sockets with protective earth.

Warning! Risk to health from contaminated device

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

Caution! Damage and corrosion from spilled liquids.

1. Disconnect the power plug if relatively large quantities of liquid are involved.
2. Mop up spilled liquids immediately. When mopping up, pay particular attention to specifications in the safety data sheet.
3. 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.

Caution! Damage to the device from the device tilting.

- When transporting the epMotion 5070, ensure that the center of gravity is at the back.
- Follow national safety regulations relating to the transport of heavy loads.
- Carry the epMotion 5070 using at least two people and only grip the device from underneath at the sides.
- Place the epMotion 5070 on a level, firm work surface with an adequate load-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.

Caution! Damage due to overheating.

- Do not place the device close to sources of heat (e.g. radiator, drying cabinet).
- Do not expose the device to direct sunlight.
- Allow air to circulate freely by leaving at least 6 cm to adjoining devices or to the wall and keep the underside of the device clear.

3 Safety — Safety Devices

Caution! Impaired function

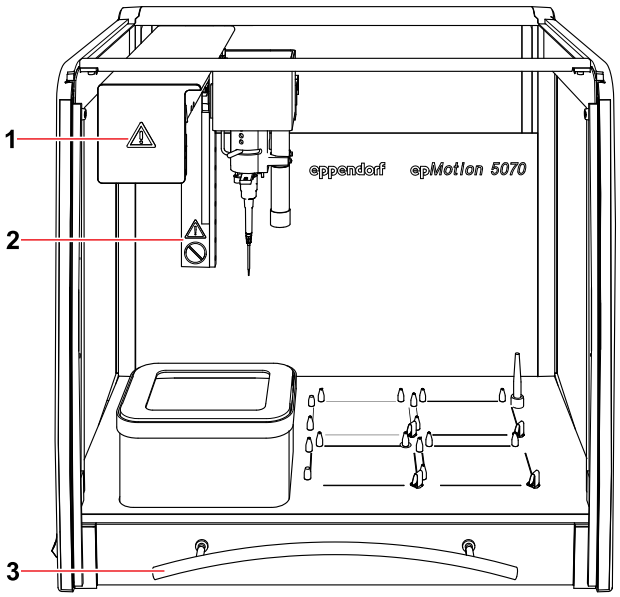
- Do not place the epMotion 5070 on a surface with devices which may generate vibrations (e.g.vortex mixer, thermomixer, centrifuges).

Caution! Poor safety due to missing operating manual.

- When passing on the device, always enclose the operating manual.
- If you lose the operating manual, request a replacement. You can also find the current version of the operating manual and the safety instructions on our website www.eppendorf.com.

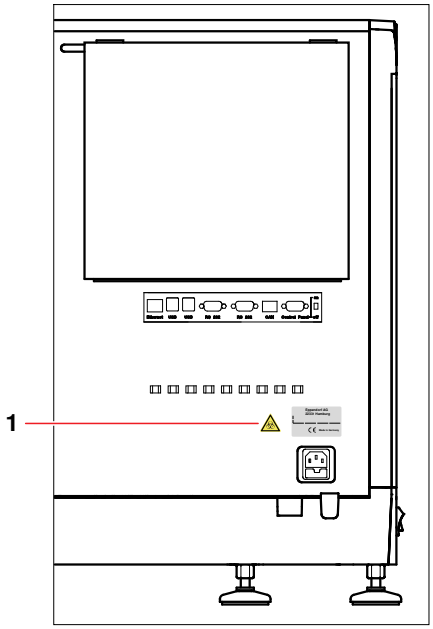
3.3 Safety Devices

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		The front hood serves as a safety device.

3 Safety — Safety Devices



1		**DANGER** Hazardous chemicals cause burns and other health hazards. 1. Observe the material safety data sheets for the biological and chemical substances used. 2. Wear personal protective equipment (PPE) at all times when working with biological or chemical substances. 3. Follow the instructions for cleaning and decontamination, and ensure that hygiene safety standards are maintained.

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.

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.

Warning! Risk of injury from movements by the carrier.

1. Press the Stop key on the control panel.
2. Wait until the carrier has completed its movements.
3. Only open the front hood when all the movements are complete.

4 Operation First steps

Caution! 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.

4.1 First steps

4.1.1 Check correct installation

Before using the epMotion 5070 for the first time, please ensure

- that the epMotion 5070 has been correctly connected and commissioned.
- that the device is not damaged in any way.

4.1.2 Switch on the epMotion 5070 and log on as a user

Requirement

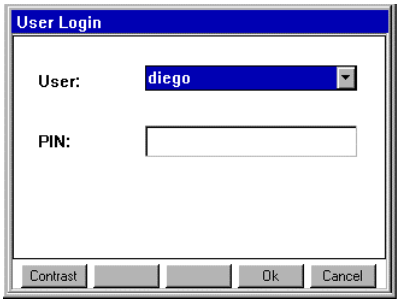
In order for you to be able to use your name to log on to the epMotion 5070, your administrator has to set up a user account for you. To do this, contact your in-house administrator responsible for this. He will give you your user name and the associated PIN.

Detailed information on setting up user accounts is provided separately . (see *Create and edit a user account* on page 158).

The epMotion can be operated with or without PIN protection.
If you are working with PIN, only the logged-on user can start or edit his methods. It is not possible to start methods belonging to other users. The logged-on user can view other people's methods and copy them to his directory. The administrator is automatically logged on with every user via his PIN.
If you are working without a PIN, all users have identical rights and can make administrator settings.

Perform the following steps in the sequence described.

1. Switch on the epMotion 5070 at the mains switch.
   The control panel switches on automatically and the software is loaded.
   After loading, the **UserLogin** window appears in the display of the control panel.
   Use the **Contrast** function key to reach contrast settings where you can change the brightness of the display.



2. Select the user name from the list.

3. Click in the **PIN** field or on key **Press Next**.
   The cursor switches to the field **PIN**.

4 Operation

4. Enter your personal PIN using the numerical keys on the control panel. Delete an incorrect entered PIN using the **Delete** key and repeat the PIN entry. **Delete** deletes characters to the right of the cursor.

5. Press the **OK** function key to confirm the entry.
   The navigation tree appears in the display of the control panel.

You are now logged on under your user name and can operate the . epMotion 5070

4 Operation Overview of operation with the control panel

4.2 Overview of operation with the control panel

This section gives you an overview of operating the epMotion 5070 with the aid of the control panel.

Sequences of actions in this manual are described for operation using the control panel. However, you can also operate the epMotion 5070 using the mouse.

4.2.1 Menu structure

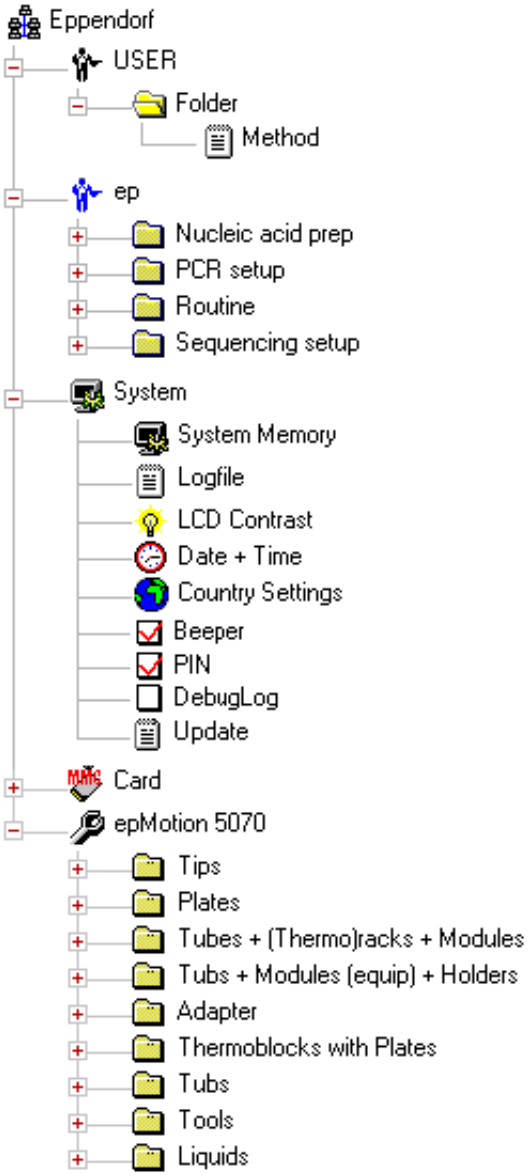


Fig. 9: Control panel menu structure for the epMotion 5070

4 Operation — Overview of operation with the control panel

4.2.2 Main navigation

Fig. 10: Top level of the navigation tree

The navigation tree contains the following nodes (branches):

Eppendorf — **Eppendorf** is the main node which contains all the other nodes. If this node is marked, you can use the **Prop.** function key to display the software version of the control panel.

User directories — A user directory is set up for all users set up (in the example, Diego, Felicia etc.). You can start the methods in your own user directory directly.

You can also edit these methods and save the changes or create completely new methods for your own applications or create folders.

ep — Under this node you have available a number of predefined methods which you can copy into your own user directory in order to use them. You cannot start or edit the methods in the **ep** node itself. If this node is marked, you can use the **Prop.** function key to have the software version of the epMotion displayed.

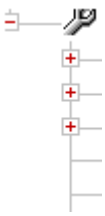
System — This node contains the most important system settings. Some settings can only be edited by the administrator (see *System settings* on page 159). In this node, each user can set contrast, export and delete a debug file and display and export the logfile.

Card — This node is for transferring data between the internal memory and the MultiMediaCard (MMC™).

epMotion — In this node, all the labware and the preset liquid types are administered. These settings can only be edited by the administrator.

4.2.3 Navigating in the Navigation Tree

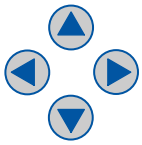
To open a node in the navigation tree, you have three options.



- Use the mouse to click on the plus symbol in front of the node.

- Alternatively, use the mouse to **double-click** on the desired node.

4 Operation — Overview of operation with the control panel

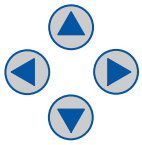


- Alternatively, mark the node using the arrow keys and press Enter or press the **right arrow** arrow key.

  The node is opened and the plus symbol in front of the node changes into a minus symbol.

  To close the node, follow the reverse sequence.

- Use the mouse to click on the minus symbol in front of the node.
- Alternatively, use the mouse to double-click on the node.



- Alternatively, mark the node using the arrow keys and press Enter or press the **left arrow** arrow key.

  The node is closed and the minus symbol in front of the node changes into a plus symbol.

4.2.4 Keys on the control panel

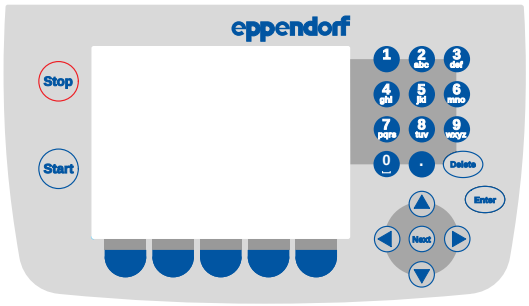


Fig. 11: Keys on the Control Panel

The following keys are available on the control panel.

4.2.4.1 Enter Key

Using the Enter key, you can

- confirm entries, e.g. your PIN when logging on.
- execute the function of a selected, marked button, e.g. open the worktable if the **Worktable** button is marked.
- open or close a marked selection list, e.g. to select the user name when logging on.
- open or close a marked node in the navigation tree.
- open a marked method in the navigation tree in order to edit it.

4.2.4.2 Next Key

Use the Next key to move the cursor to the next input field or to the next button. The key is comparable to the Tab key on the PC which you can likewise use to switch between the fields of a form, for example.

If you use the mouse, you can also click on any input field and any button directly with the mouse, rather than pressing the **Next** button.

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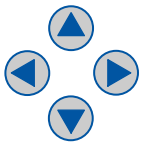
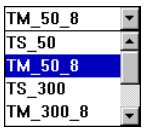
4 Operation — Overview of operation with the control panel

4.2.4.3 Arrow Keys



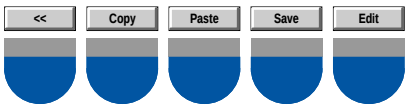
You can use the arrow keys to navigate step by step in the display, e.g. in lists and input fields and in the navigation tree.

- Within a **List** you have opened using the Enter key, you move up and down through the entries step by step using the arrow keys.
- To select the marked option, press the Enter key again.



- Use the **down** arrow key to navigate from one field to the next.
- In **input fields** in which you can enter text or numbers, you move from one character to the next using the **right** and **left** arrow keys.
- In the **Navigation Tree** you can reach all open nodes using the **up** and **down** arrow keys.
- Using the **right** and **left** arrow keys you can open or close the currently-marked node in the navigation tree.

4.2.4.4 Function keys with currently-available functions in the display



The function keys have changing functions depending on the software window in which you are currently located. The current function of every key is shown in the display directly above the key.

To execute a function, press the relevant function key.

If you use the mouse, you can also click on the function directly in the display using the mouse instead of pressing the function key.

4.2.4.5 Start Key

Use the Start key to start a marked method immediately.

4.2.4.6 Stop Key

Use the Stop key to stop a current method. The current movement is completed before the method is stopped.

4 Operation — Overview of operation with the control panel

4.2.4.7 Numerical Keys

Use the **numerical keys** to enter numbers and text in input fields.

- To enter numbers, press the relevant numerical keys. For decimal numbers with numbers after the decimal point, use the period as a decimal point.
- To enter text, use the numerical keys as when writing a text message or SMS (Short Message Service) on a mobile phone: press the key with the relevant letter on it until the letter you want is displayed.

  Example: to enter "pcr3" in a text field
  - To enter the letter **p**: press **Key 7 once**
  - To enter the letter **c** : press **Key 2 three times** quickly in succession
  - To enter the letter **r**: press **Key 7 three times** quickly in succession
  - To enter the **Space**: press **Key 0 (zero) twice** quickly in succession
  - To enter the number **3**: press **Key 3 four times**

You cannot enter capital letters and "." using the numerical keys.
"." can only be entered in comments using the software keyboard.

4.2.4.8 Delete Key

Use the Delete key to perform various deleting operations, e.g.:

- in input fields
  - when the entire text in the input field is marked: delete the entire entry
  - when the cursor is located within the entry: delete letters and numbers one by one to the right of the cursor (use the arrow keys to move the cursor to the desired point if necessary)
- in the navigation tree: delete marked folders or methods
- on the worktable:delete marked labware from worktable
- in the procedure: delete marked commands from the procedure

4 Operation — Overview of Operating Sequence

4.3 Overview of Operating Sequence

In normal mode of the epMotion 5070, you generally perform the following sequences.

1. Insert or change dispensing tool
2. Position labware on the worktable
3. Select method and start
4. End method

As **User**, you can also perform the following sequences.

- Create and edit your own methods (see p. 39)
- Administer and backup data (perform backup) (see p. 161)

As **Administrator** with your own administrator PIN, you can also perform the following sequences.

- Compile your own labware from existing components (see p. 106)
- Configure the system (see p. 159) and administer user accounts (see p. 158)

4.4 Insert or change dispensing tool

This section describes how you fit or change the dispensing tool required for your method.

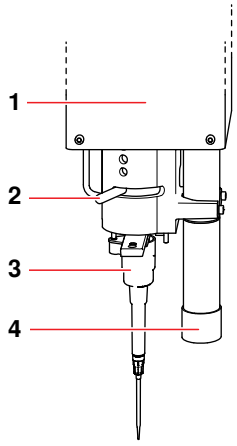


Fig. 12: Carrier with Optical Sensor

1 Carrier	**2 Lever**
3 Dispensing tool (shown here - single-channel dispensing tool)	**4 Optical sensor**

Caution! 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.

4 Operation — Insert or change dispensing tool

4.4.1 Fit dispensing tool

Perform the following steps in the sequence described.

1. Push the lever on the carrier to the far right.
2. Take the dispensing tool in your hand and turn it so that the blue labeling and the volume range information on the top web are facing you.

   The ejector pin of the dispensing tool is now on the left. On eight-channel dispensing tools, the channels are oriented in the y direction (i.e. from the back to the front).
3. Insert the dispensing tool in the opening of the tool holder on the carrier from beneath and push it in up to the stop.
4. Push the lever on the carrier to the left up to the stop. If the lever cannot be moved, push the dispensing tool more firmly into the opening of the carrier.

If you push too hard against the carrier when fitting the dispensing tool, the carrier may slide backwards. However, the carrier sliding backwards does not have any effect.

---

5. Check that the dispensing tool is firmly located.

   The dispensing tool is now inserted.

Check regulary if the dispensing tool is firmly located.

4.4.2 Disassemble dispensing tool

Perform the following steps in the sequence described.

1. Grip the dispensing tool firmly in the hand.
2. Push the lever on the carrier to the far right.
3. Pull off the dispensing tool in a downward direction.

   The dispensing tool has now been disassembled and you can insert another as described above.

4.4.3 Notes on dispensing procedure

Eight-channel dispensing tools are only moved in the x direction (from left to right) over a 96-well plate.

For dispensing processes in 384-well plates, eight-channel dispensing tools can also execute a step in the y direction (from the back to the front). All the channels of the eight-channel dispensing tool are always filled or liquid is always dispensed from all channels. With 384-well plates, the eight-channel dispensing tool reaches only every other well of a 16-well row. Using the above-mentioned y step, liquid can be added to or removed from every well of a 16-well column in a 384-well plate. Depending on programming, single-channel dispensing tools move over a location in the x and y directions.

4 Operation — Position labware on the worktable

4.5 Position labware on the worktable

In this section you will get 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 5070 and to incorporate it in the labware directories of the software. For more information on this, contact Eppendorf Service.

4.5.1 Position labware

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

Caution! 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.

1. 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.
2. Remove the lid from the Tip Rack.
3. When using Module Racks: place the filled Reservoir Rack on a "B" location. "A" locations may not be used.
4. Position the other labware required for your method in any locations. In the process, ensure that the labware is not tilted.
5. 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.
6. After supplying the worktable, close the front hood.

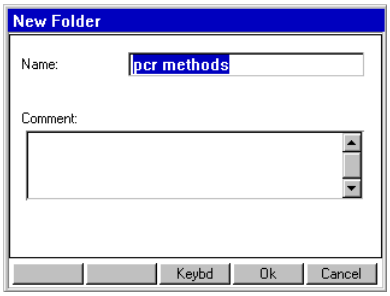
4 Operation — Create and start method

4.6 Create and start method

4.6.1 Create new folder in user directory

In order to create a folder for your methods in your user directory, proceed as follows.

1. Mark user directory.
2. Press the **New Folder** function key.
3. Use the numerical keys on the control panel to enter a name for the new folder. Instead of the numerical keys you can also use the software keyboard which you reach via the **Keybd** function key.



4. In order to enter an additional comment to the new folder, use the down arrow key to go to the **Comment** field.
5. Use the numerical keys to enter a comment text and confirm with **OK**.

   The folder is set up and appears in the navigation tree under the node for your user directory.

   You can change the name of the folder at any time using the **Prop.** function key.

4.6.2 Create and save methods

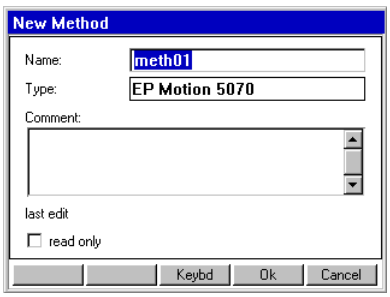
A method consists of two parts.

- **Worktable**:this is where you specify in which locations tips, racks, plates etc.are found.
- **Procedure**: this is where you define the sequence of a method with the aid of commands.

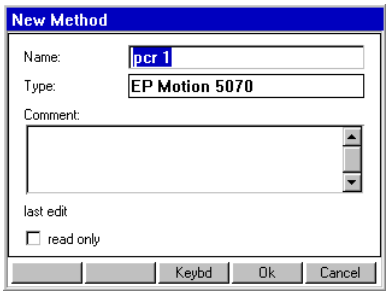
4.6.2.1 Create a new method

To create a new method, proceed as follows.

1. In the navigation tree, open your own user directory and, if appropriate, the subdirectory in which you want to create the new method.
2. Press the **New** function key.



The **New Method** window appears in which you can enter a name and a comment for the new method using the numerical keys.



3. Press the **OK** function key.
   The method is created and appears in the navigation tree in your user directory.
   You can change the name of the method or the comment at any time with the aid of the **Prop.** function key.

To protect a method from changes, you can mark it "**read only**". The method can then be displayed in "Show Mode" but not edited. Write protection can only be activated using the **read only** function once you have finished editing the method. The function is recommended where you are working without a PIN.

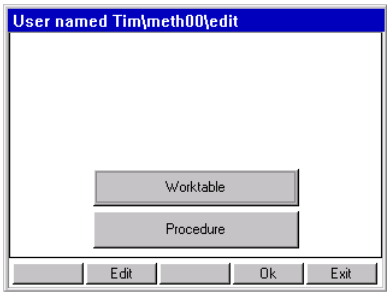
4.6.3 Supply worktable

When compiling a method, start in Worktable mode and first supply the worktable with the required labware. Then switch to Procedure mode to define the sequence of commands.

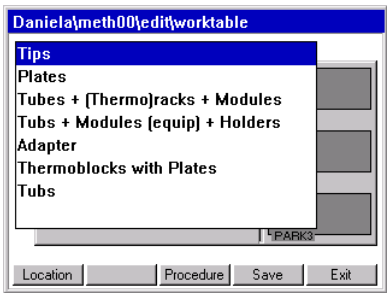
4.6.3.1 Edit method in worktable mode

To open a method for editing, proceed as follows.

1. Mark the method in the user directory and press the **Edit** function key.
   The method is opened.



2. Mark the **Worktable** button and press Enter.
   The worktable is opened. The list of available labware is displayed in the foreground, sorted by labware type. The display of locations is in the background.



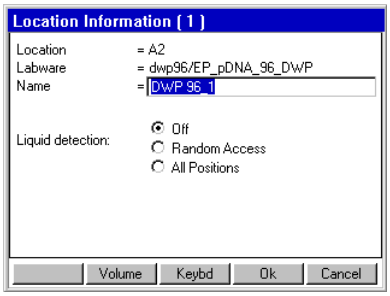
3. To switch to the Locations display: press the **Location** function key. Correspondingly you switch back to the labware list via **Labware**.

4.6.3.2 Position labware on the worktable

To position labware on the worktable, proceed as follows.

1. Select a labware type from the labware list and open it.
2. Select the desired labware and adopt by pressing Enter.
   The selected labware is copied into the buffer memory and the display switches to the Locations display.
3. Mark the location in which the labware is to be positioned and press Enter.
   The labware is positioned in the location.

   The **Location information** window is opened, the information about this location is displayed.



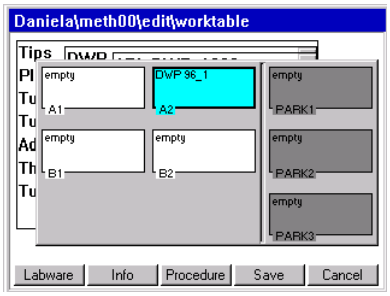
4. If you would like to edit the name of the labware at this location: enter the name using the numerical keys.
5. If the Optical Sensor is to perform liquid detection at this location during the method, then set the desired option.
   The following options are available.

   Off:
   liquid detection is switched off at this location.

   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 a few randomly-selected positions of this labware. Liquid detection should not be activated with racks and plates with 96 positions, as this is time-consuming.

   You reach the volume input window via the **Volume** function key.
6. Confirm the settings with the **OK** function key.
   The labware is positioned in the location.



   Use the **Info** function key to reach the **Location information** window. There you can change the labware name for the display on the worktable and set liquid detection.
7. Proceed in the same way to supply the other locations on the worktable.

The three parking positions on the right next to the locations are shown only in the software. You can fill the parking positions with labware which is intended to replace the labware from the locations during the method run.
If labware is listed in the parking positions, get this ready outside the device.

4.6.3.3 Remove labware from worktable

1. Mark the location from which you would like to delete labware.
2. Press the Delete key on the control panel.
   A question appears in the display, asking whether you are sure you wish to delete the labware. Exit the query by pressing **Yes** or **No**.

4.6.4 Define procedure

When you have finished supplying the worktable with the required labware, switch to Procedure mode and specify the sequence of commands the epMotion 5070 is to perform.

4.6.4.1 Open method for editing in procedure mode

You can reach Procedure mode directly from the worktable or when opening a method.

- If the method is already open and you have previously edited the worktable: press the **Procedure** function key in the worktable display.
- If the method is not open: mark the method in the user directory and press the **Edit** function key. Then mark the **Procedure** button and open by pressing **OK**.

  The procedure is opened. The list of available commands is displayed.

4.6.4.2 Brief overview of available commands

The parameters and options for the commands are described using Sample transfer. Parameters and options of individual commands which deviate from Sample transfer are described separately.
Each command requires characteristic settings. For further detailed information about all commands and settings, see the Appendix.

The following commands are available for defining the procedure.

4.6.4.2.1 Number of Samples

Use the **Number of Samples** command to specify how many samples are to be edited/processed in the subsequent steps of the procedure. The command is used several times in a method if the number of samples changes during the sequence of the procedure.

Parameters/Options

- **Fixed** number of samples: activate this option if you would like to define a fixed number of samples.
- **Maximum no. of samples**: in the case of a fixed number of samples, you enter the fixed number. In the case of a variable number of samples, enter the maximum number of samples.
- **Comment**: enter a comment if required.

4.6.4.2.2 Sample Transfer

Using **Sample Transfer**, samples can be transferred from several positions of an item of source labware to several positions of an item of destination labware.

Parameter

- **Pipet. Tool/Filter Tips**: select from the list the dispensing tool which is to be used for the transfer operation. If you are using filter tips, activate this function.
- **Volume**: enter the volume to be dispensed in each pipette or multidispense step.
- **Pipette/Multidispense**:
  - **Pipette**: the volume set above is aspirated or dispensed in each step.
  - **Multidispense**: the volume set above is dispensed in each multidispense step.
- **Source/Destination**: select source and destination labware from the worktable assignment.
- **Pattern**: the pattern is used to specify aspiration and dispensing positions within this command.
  - Automatic pattern detection: mark the button next to Pattern and press Enter; a diagram of source/destination labware appears in the display. While you are defining a pattern, the software continuously determines the next possible position and indicates it in the form of a gray marking. Only regular patterns are permitted.
  - Standard pattern: use **standard** to specify a simple standard pattern for sample transfer. For source and destination, the pattern is worked through in the x direction in **row-wise** (or in a plate, row-wise), and in the y direction in **column-wise** (or in a plate, column-wise).
  - Free pattern (**irregular**): use "irregular" to select a pattern with any aspiration and/or dispensing position for the destination for a single-channel tool.

Options

- **Special**:
  - **Aspirate from bottom**: select if the sample is to be aspirated from the bottom of the well.
  - **Dispense from top**: select if the liquid is to be dispensed from the top edge of the well.
  - **Elution from filter**: select if the liquid is to be aspirated from the PCR Cleanup filter plate.
- **Change tips**: select one of the available functions which specifies when the tips are to be changed.
- **Mix before aspirating/Mix after dispensing**: activate the relevant option if the liquid is to be mixed before aspiration/after dispensing. State the number of mixing cycles, speed and the volume to be mixed.
- **Fixed height**: if you wish to give fixed height positions for mixing, then activate this option and enter the required values for aspiration and dispensing level.

Liquid types

If liquids whose physical properties of viscosity, vapor pressure and surface tension differ very significantly from those of water are to be dispensed, we recommend using a different liquid type.

- **Standard liquid type**: select the liquid type for the sample you wish to transfer.
- **Change parameters**: to change the settings for the selected liquid type for this command, activate the checkbox and set the values to suit your requirements.
- **Set default**: reset all values to default settings.

4.6.4.2.3 Reagent Transfer

A reagent is transferred from one position of the source labware to several positions of the destination labware.

Deviating Parameters

- **Pattern**: no standard pattern available.

If you happen to be working with several source tubes, see the comments in the Appendix (see *Special case: use of several sources* on page 147).

4.6.4.2.4 Dilute

The **Dilute** command is a modified Sample Transfer 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.

Deviating Parameters

- **Transfer type**: here only **Pipette** is available.
- **Special**: **Elution from filter** not applicable.
- **Pattern**: no standard pattern available. Irregular pattern applicable only to source positions.

4.6.4.2.5 Pool

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

Deviating Parameters

- **Pattern**: no standard pattern and no irregular pattern available.
- **Special**: **Elution from filter** not applicable.

4.6.4.2.6 Pool One Destination

Use the **PoolOneDest** command to dispense liquids from several source positions to one destination position.

Deviating Parameters

- **Pattern**: no standard pattern available. Irregular pattern applicable only to source positions.
- **Special**: **Elution from filter** not applicable.

4.6.4.2.7 Mix

Use the **Mix** command to mix liquids within a position.

Deviating Parameters

- **Number of cycles**: enter the number of mixing cycles.
- **Speed**: specify mixing speed.
- **Tool**: select from the list the dispensing tool which is to be used for mixing.
- **Filter tips**: if you are using filter tips, activate this option.
- **Mixing volume**: enter the volume to be aspirated in each mixing cycle.
- **Fixed height**: if you wish to give fixed height positions for mixing, then activate this option and enter the required values for aspiration and dispensing level.
- **Racks**: select the racks, plates or tubes on the worktable on which the mixing command is to be executed.
- **Pattern**: no standard pattern available. No source and destination selection available.

4.6.4.2.8 Exchange

This enables you to switch two labware items on the worktable manually.

4.6.4.2.9 Wait

The **Wait** command specifies a pause before the next step.

4.6.4.2.10 Comment

Use the **Comment** command to enter a comment line to be displayed at a particular point in the procedure.

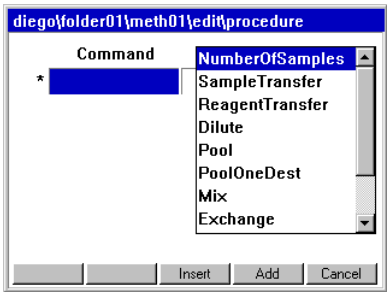
4.6.4.2.11 User Intervention

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

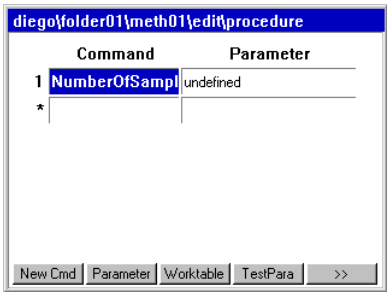
4.6.4.3 Add command to procedure

Proceed as follows.

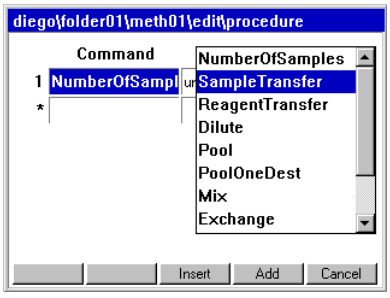
1. Open the method in Procedure mode(see *Define procedure* on page 42).
   The list of available commands is displayed.



2. Mark a command in the list and press the **Add** function key.



   The command is added to the procedure, e.g. in this case, the **Number of Samples** command.
3. In order to add another command, press the **New Cmd** function key.
   The list of commands is displayed.
   You now have the following options.
   - To append the new command **to the end of the procedure**: mark the command in the list and press the **Add** function key.
   - To insert the new command **above the currently-marked line**: mark the command and press the **Insert** function key.



4. If necessary, edit the parameters of the inserted commands (see *Remove command from procedure* on page 46).

4.6.4.4 Remove command from procedure

1. Mark the command which you would like to delete from the procedure and press the **Delete** key.

   A question appears in the display, asking whether you are sure you wish to delete the command.
2. To delete the command, press the **Yes** function key.

   The command is deleted from the procedure.

4.6.4.5 Edit parameters of a command

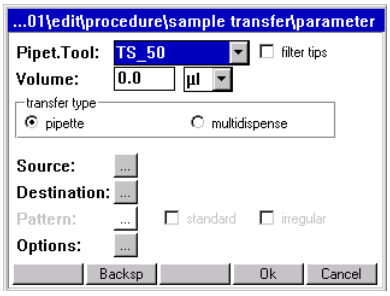
This section describes how to proceed in general to edit the parameters of a command.

Each command has characteristic parameters.

Proceed as follows.

1. Mark the desired command in the procedure and press the **Parameters** function key.
   The Parameters window for this command appears in the display, e.g. for a Sample transfer.

   You can now edit the parameters.



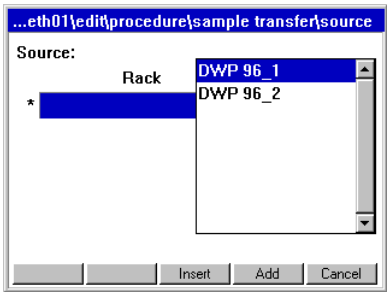
2. Select a dispensing tool from the **Pipet. Tool** list. If you are using filter tips, activate the **filter tips** option.
3. Set the volume to be dispensed and select the transfer type (**Pipette** or **Multidispense**).
4. Select source and destination for the command: mark the button next to **Source** and **Destination** and press the Enter key. Then select the locations desired in each case.
5. Specify the pattern for the command: mark the button next to **Pattern** and press the Enter key. Then define the pattern.
6. Specify further options for the command (e.g. liquid type, settings for mixing and changing tips): mark the button next to **Options** and press Enter. Then set the desired options. Detailed information about liquid types can be found in the Appendix (see *Liquid options* on page 139).

4.6.4.6 Specify source and destination for command

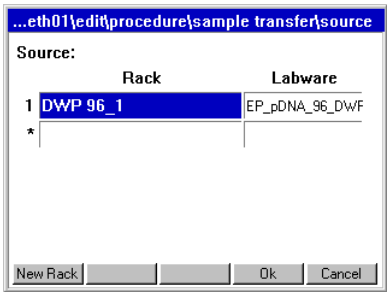
This section describes how you proceed to specify the source and destination for a command.

Proceed as follows.

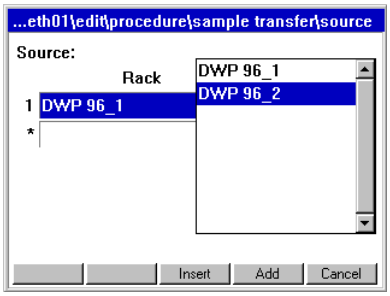
1. Open the Parameters window of the command.
2. Mark the button next to **Source** and press the Enter key.
   A list of the labware you have previously defined for the worktable appears in the display.



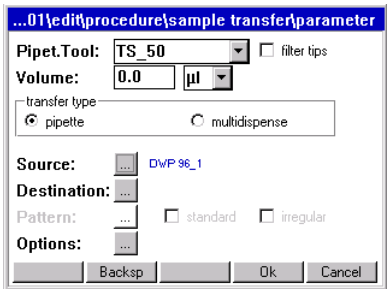
3. Mark the desired source labware and adopt with **Add**.
   The source location is defined and is shown in the display.



4. To add more source locations (a maximum of four locations is possible): press the **New Rack** function key.
   The list of labware for the worktable appears in the display.
   You have the following options.
   - In order to append the new labware **to the bottom of the list**: mark the desired labware and press the **Add** function key.
   - To insert the new labware **above the currently-marked line**: mark the labware and press the **Insert** function key.



5. Specify further locations in the same way if required.
6. Confirm the selection using the **OK** function key or Enter.
   The source locations are displayed in the Parameters window of the command next to **Source**.



7. Mark the button next to **Destination** and press Enter.
8. Select one or more destinations for the command as described above for the source locations.
9. Confirm the selection with **OK**.
   The destination locations are displayed in the Parameters window of the command next to **Destination**.

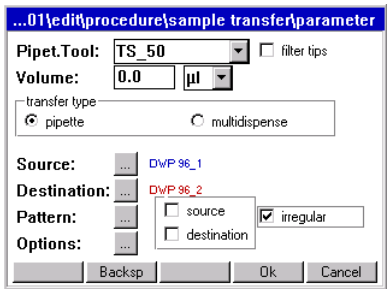
4.6.4.7 Specify pattern for command

You can define Pattern using automatic pattern detection, simple standard pattern (Sample Transfer only) or free pattern (irregular). The patterns are independent of direction.

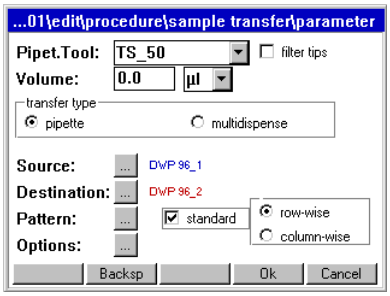
If you are using the reservoir rack with module racks and reservoirs in your method, you can only use irregular patterns.
Exception: the reservoir rack is occupied throughout with identically-supplied module racks or reservoirs. In this case, the pattern with automatic pattern detection and the standard pattern (in the case of sample transfer) can also be used.

Example: define pattern for a Sample transfer

The following section uses the example of the pattern for a **Sample transfer** to describe how you specify a pattern for a command. The basic principle of compiling a pattern is identical for all commands.



1. Open the Parameters window of the command.
2. Define source and destination.
3. To define a simple standard pattern, next to **Pattern** activate the **standard** option and select the desired alignment.

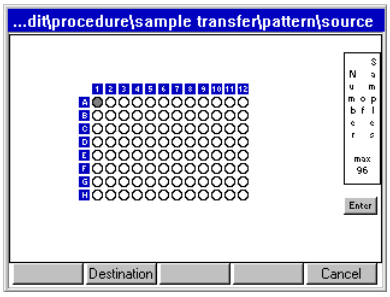


This defines the simple pattern.

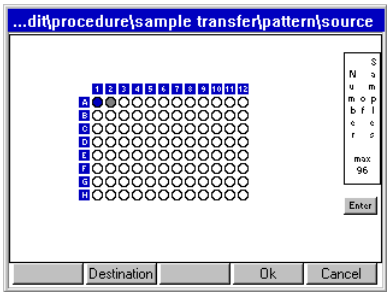
If you need a regular pattern with automatic pattern detection, a number of additional steps are required. The following example describes defining a pattern to pipette a sample from the first column of a source plate 1:1 into the second column of a destination plate. To do this, proceed as follows.

Regular pattern with automatic pattern detection

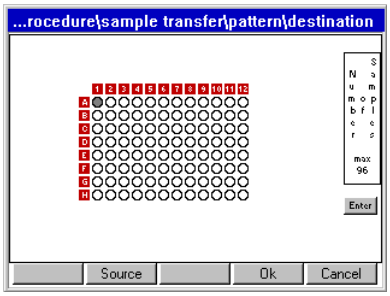
4. Mark the button next to **Pattern** and press Enter.
   A diagram of the source plate appears in the display.



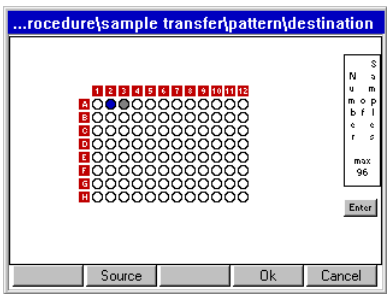
5. Using the arrow keys, mark the first position in the source plate from which liquid is to be aspirated (in the example, this is position A-1) and press Enter. If you want to adopt the proposed position, confirm this by pressing the Enter key.
   The position is marked in color (blue in the example).



   While you are defining a pattern, the software continuously determines the next possible position and indicates it in the form of a gray marking. If this proposal does not agree with your desired pattern, ignore the gray marking and continue defining your pattern.
6. Press the **Destination** function key.
   A diagram of the destination plate appears in the display.

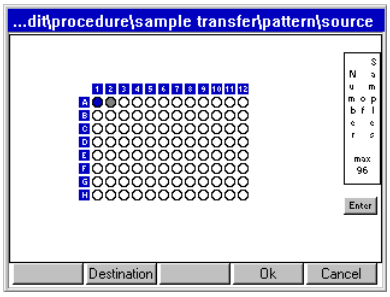


7. Mark the first position (or positions) in the destination plate to which the liquid is to be transferred (position A-2 in the example), and press Enter.
   The position is likewise marked in color (blue in the example).

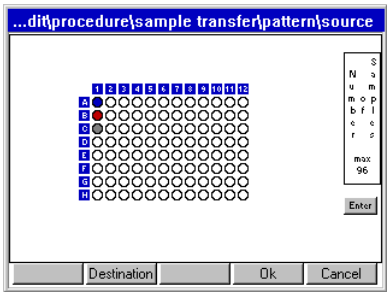


8. Press the **Source** function key.
   The source plate appears in the display again.

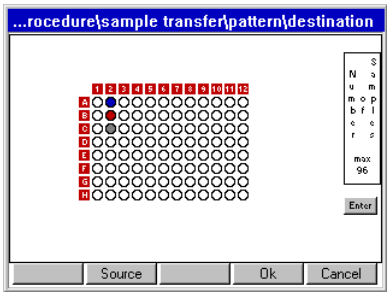
4 Operation — Create and start method



9. In the source plate, select the second position from which you would like to aspirate liquid, e.g. position B-1.
   The second position is marked in color (red in the example).



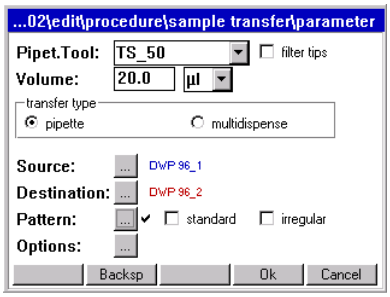
10. Switch to the destination and select the position (or positions) to which the liquid is to be transferred from the second source position (in the example, position B-2).
    The second position is likewise marked in color (red in the example).



In the example, the software detects the right pattern at this point: the next proposed step (the gray marking) matches the desired pattern in both the source plate and in the destination plate. You can thus confirm the pattern with **OK** at this point.

In principle you have two options for assessing the pattern detected by the software.

- if you wish to discard the entire pattern: press the **Cancel** function key. Confirm the **Save changed data?** query with **Yes**.
  You then return to the Parameters window of the command. Start from the beginning with a new pattern.
- If the pattern proposed by the software is what you want, confirm with the **OK** function key.
  The software automatically completes the pattern up to the number of samples if this has been defined in a preceding **Number of samples** command in the procedure. You return to the Parameters window of the command.



The tick next to **Pattern** indicates that a pattern is defined for this command.

Standard pattern

Use **standard** to specify a simple standard pattern. The standard pattern can only be specified for the Sample transfer operation. For both the source and the destination, the pattern is worked through in the x direction in

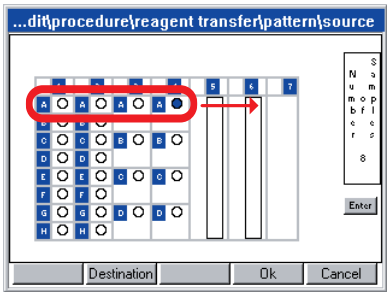
- **row-wise** (or in a plate, in rows (A1, A2, A3 etc.)) and in the y direction in
- **column-wise** (or in a plate, in columns (A1, B1, C1 etc.)

Irregular pattern

Use **irregular** to specify a pattern with any aspiration positions for the source and/or any dispensing positions for the destination for single-channel dispensing tools. The irregular pattern can be defined as a function of the command for source, destination or both.

- Sample Transfer, Reagent Transfer: source and/or destination
- PoolOneDestination, Dilute: source (destination is not available)
- Mix, Pool: no irregular pattern possible

If you would like to reach a reservoir within a Module Rack, you must mark a position in row A and use the arrow keys to navigate to the reservoir. You do not reach the reservoir from positions in other rows (such as row B, row C etc.).



Replicates are not possible with this pattern.

4.6.4.8 Check an existing pattern

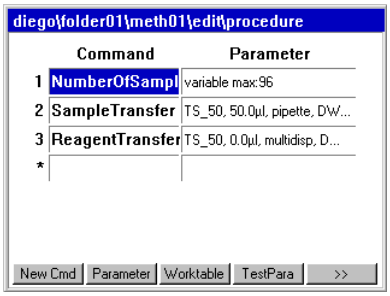
1. Mark the button next to **Pattern** in the Parameters window of the command and press Enter. Then in the Pattern window, press the **Show pat.** function key.
   The pattern is displayed as a sequence with color-coded positions.
   You can stop the pattern being displayed if required by pressing the **Stop** button.
   Use **Source** or **Destination** to switch between the source plate and the destination plate in the display.
2. To delete the existing pattern: press the **New pat.** function key.
   You can now specify a new pattern.

If you change the dispensing tool, the source or the destination, you will have to define a new pattern.

4.6.5 Check method (parameter test)

Use the parameter test to check whether all the parameters required for the method have been set.

1. Open the method in Procedure mode (see *Define procedure* on page 42).
   The list of defined commands is displayed:



2. Press the **TestPara** function key.
   The method is checked.
   If parameters are missing, you will receive the appropriate messages.
3. Add the missing parameters and repeat the parameter test until you are no longer receiving error messages.

4.6.6 Copy predefined methods into user directory

A number of predefined methods is available for you under the **ep** node in the navigation tree. To use them, copy these methods into your own user directory. Only then is it possible to start them.

To copy a method from the **ep** node into your user directory, proceed as follows.

1. In the navigation tree, open the **ep** node and within that, the directory containing the desired method.
2. Mark the method and press the **Copy** function key.
   The method is copied into the buffer memory.
3. In the navigation tree, open your own user directory and within that, any subdirectory into which you would like to add the method.
4. Press the **Paste** function key.
   The method is added to your user directory. You can now start or edit this method.
   Instead of an individual method, you can also copy a whole method folder and all the methods it contains from the **ep** node into your user directory. To do so, proceed just as described above, but before copying, instead of marking an individual method, mark a method folder.

4.6.7 Activate and deactivate Optical Sensor

Perform the following steps to deactivate the Optical Sensor.

1. In the navigation tree, mark the **epMotion** node and press the **Prop.** function key.
   The settings for the Optical Sensor are displayed. You can activate or deactivate the following settings individually:

   Liquid Detection (Level)
   If this option is active, the Optical Sensor checks the liquid level in the tubes if liquid detection has been specified for these tubes in the method.

   Tips (Type and Quantity)
   If this option is active, the Optical Sensor checks the type and quantity of tips in the Tip Rack.

   Locations (racks, tubs, height of plates etc.)
   If this option is active, the Optical Sensor detects the labware on the worktable and checks that it matches the method. In the process, the height of positioned labware components is also checked. In addition, coded racks are identified by their code being read.
2. Deactivate options and confirm the change with **OK**.
   The Optical Sensor is deactivated.

   You can subsequently reactivate the settings in the same manner.

The Optical Sensor can also be activated or deactivated for individual method sequences in Start mode using the **Prop.** function key.

4.6.8 Start method

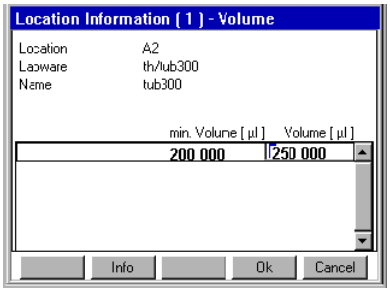
Caution! Damage as a result of incorrectly-positioned labware or dispensing tools.

- Ensure before starting the method that the labware on the worktable is positioned exactly as defined in the method.
- Ensure that the dispensing tool defined in the method is inserted. If the dispensing tool inserted does not correspond to the one defined in the method, an error message appears.

1. In the navigation tree, open the user directory and, if appropriate, the subdirectory where the desired method is located and mark the method.
2. To view general information about this method and any comments, mark the method and press the**Prop.** function key.
   An information window about the selected method appears. You can check under **Type**, for example, whether the correct instrument is shown and check the comment in the **Comment** field. Close the information window by pressing **Cancel**.
3. To start the method, press the **Start** function key.
   Depending on the method, the **Number of samples** window may appear.
4. Enter the number of samples for execution of the method and confirm with **OK**.
   Further **Number of samples** windows for subsequent commands in the method may appear if these have been specified under Procedure.
5. Enter the number of samples for each command and in each case confirm with **OK**.
   A window appears with the labware supply of the worktable which is stored in the method.
6. To obtain further information about a location in the method, mark the location in the display and press the **Info** function key.
7. Press the **OK** function key to close the information window.
8. When you have checked all the locations of the method with the worktable, press the **Start** key.
   If the Optical Sensor is active, the set scans will be performed automatically.

   The method will then be executed. If intervention is required during the method, the relevant requests appear in the display.

If the Optical Sensor for liquid detection is switched off, the volume display appears.



9. Check the volume and correct it if it is below the min. volume required.

We recommend performing the following test runs before starting a method.

- Test run without Tip Racks or labware and with the Optical Sensor deactivated.
  Closely observe the travel of the carrier and check whether it agrees with the method.
- Test run with Tip Racks, the correct labware and the Optical Sensor switched on. Instead of the actual samples and reagents, use water with the correct filling volumes and dispensing quantities.
- Check that dispensing is correct across the entire method.

4.6.9 Observations, method run

Caution! Faulty dispensing as a result of exchanged labware or topping-up of liquids.

- When a method is running, follow the requests in the display.
- Do not remove or exchange labware.
- Do not top up the source.

After a method is started, the procedure and the commands are displayed. The command currently being executed is highlighted in color.

- All liquids are dispensed in free jet mode.
- Before each x and y movement of the carrier, the aspirated liquid in the tip is drawn up so that there should always be air in the bottom part of the tip during the x and y movements of the carrier. If there is no air bubble, faulty dispensing operations will result. Check the filling volume entered for the tubes (exception: using the **Elution from filter** option in the **Sample transfer** command). In this case, the volume entry needs to be corrected and the whole of the method repeated.
- After Multidispense, then depending on the specification under **Change tips**, remaining liquid will be dispensed back into the source or into the waste container.

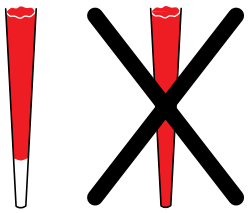


Fig. 13: Tip with and without air bubble

4.7 Stop or interrupt methods

4.7.1 Stop method prematurely

If you have to stop the method prematurely,

- press the Stop key.
  Use the Stop key to stop a current method. The current movement is completed before the method is stopped.

4.7.2 Continue method

To continue a method, the following points have to be guaranteed:

- the carrier has not been moved manually.
- the tubes on the worktable have not been topped up.
- tips have not been removed.
- Tip Racks and tubes have not been exchanged

Following premature stopping or opening of the front hood during a method run, you can continue the method or continue it step by step.

- Press the **Continue** function key.
  The method is continued.

  Alternatively,
- Press the **Step** function key.
  The next part-step is executed.

4.7.3 Abort method

- Press the **Abort** abort.
  The display shows a query. The method is aborted and cannot be continued.

4.8 epMotion 5070 Shut Down and Switch Off

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.

Caution! Loss of data as a result of switching off the device.

- Press the **Shutdown** function key before switching off the device.

Perform the following steps in the sequence described.

1. Mark the top **Eppendorf** node.
2. Press the **Shutdown** function key.
   A message appears in the display that the **Shutdown** command will end all processes currently running.
3. Press **Shutdown** again.
   The epMotion 5070 shuts down and the appropriate message appears in the display.
4. Switch off the epMotion 5070 at the mains switch.

5 Quick Start Short Instructions

5.1 Short Instructions

Only trained staff already familiar with the operating manual and the epMotion may work to the short instructions. Observe the safety precautions.

5.1.1 Select method and start

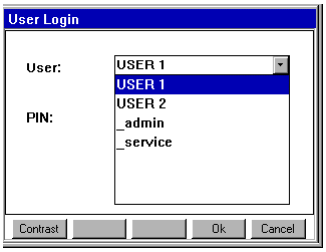
1. Switch on the epMotion.
   The software is loaded and then the **UserLogin** display appears. Log on as a user as follows.
2. Select the user from the list **User** using the arrow keys and use the **Next** key to navigate down into the **PIN** field.
3. Enter your PIN using the numerical keys and press the **OK** function key.
   The navigation tree is displayed, your user directory is marked.
4. Open the user directory using the Enter key and mark the desired method using the arrow keys.
5. **Start** several times.
   Depending on the method, the **Number of Samples** window appears or in the case of methods with a fixed number of samples, the **Worktable**. For number of samples: enter number of samples according to the request in the display and then press **OK**
6. In the **Worktable** display, check the supply of the worktable and confirm with **OK**.
7. If volume entries are necessary, the displays for volume input appear automatically. Exception: labware with a volume "0" (generally destination). If a volume change is required, mark the labware and navigate to volume input using the **Volume** and **Info** function keys. Enter volumes in µL and confirm with the **OK** function key.
8. Check whether the labware shown in the display is present in the relevant locations of the worktable and that all locations shown in the display as "empty" are indeed empty.
9. Check whether Tip Racks have enough tips in them and that all tubes are open and the waste container is empty.
10. Close the front hood and press Start.
11. If this has not yet been done, fit the dispensing tool on request, close the front hood and press **OK**
    Start the scanning procedures of the optical sensor, the method is executed.
12. Follow the requests of the display (e.g. change the dispensing tool, replace tubes etc.).
13. To switch off the epMotion **press Shutdown** and follow the user guide.

5 Quick Start — Short Instructions

5.1.2 Typical operating sequence

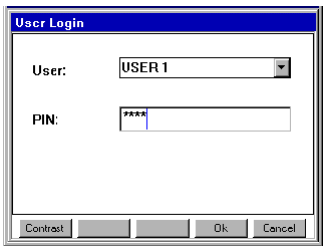
5.1.2.1 From Login to User

1. Open list of users.



2. Select user.

3. Confirm selection.

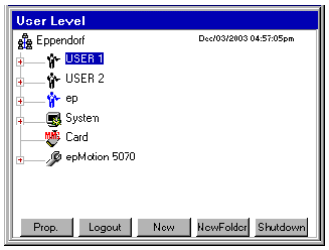


4. Navigate to PIN field.

5. Enter and confirm PIN.

5 Quick Start Short Instructions

5.1.2.2 Start method

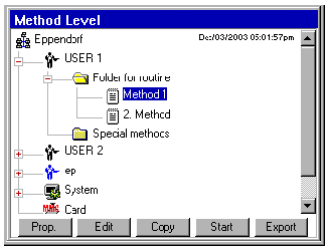


Enter

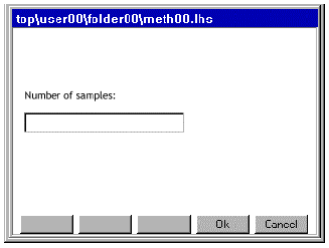
▼

Enter

1. Open directory.
2. Open folder, mark method.



Start

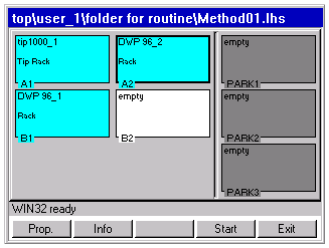


1 2 3 4 5 6 7 8 9 0 . Delete

Enter

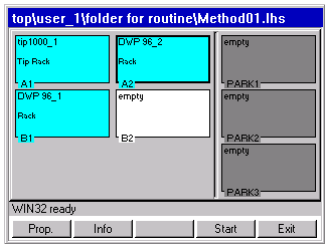
Number of samples does not appear in methods with a fixed number of samples.

3. Enter and confirm number of samples.



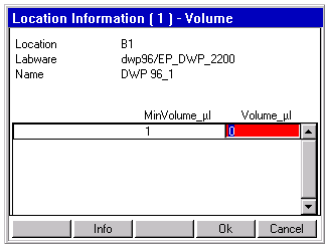
If you would like to check the settings of the Optical Sensor,

4. Press the **Prop.** several times.



5. Check the supply of the worktable.
6. Press the **Start** function key.

The window for volume input appears. Check the volume and confirm with **OK**.



1 2 3 4 5 6 7 8 9 0 . Delete

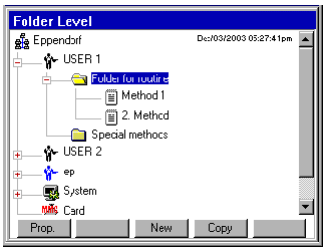
Enter

7. If liquid detection is deactivated, enter the volume manually and confirm with the **OK** function key.

The method starts.

5 Quick Start — Short Instructions

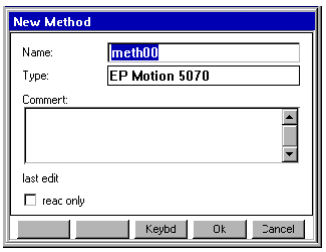
5.1.2.3 Create a new method and edit the worktable



Enter

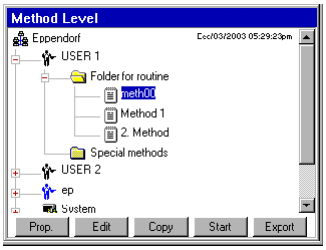
1. Open directory.

2. Press the **New** function key.

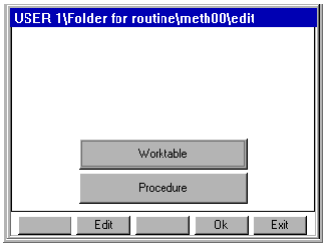


Enter

3. Enter a new name for the method or adopt the old name.

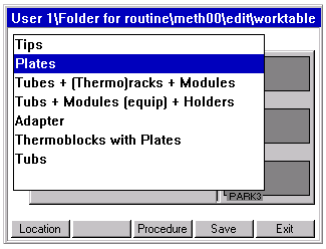


4. Press the **Edit** function key.



Enter

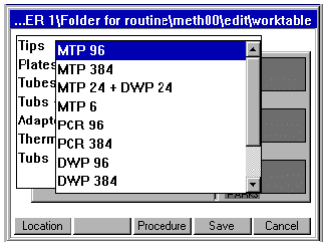
5. Open the worktable.



Enter

6. Select the labware required, e.g. **Plates**.

7. Open list of plate types

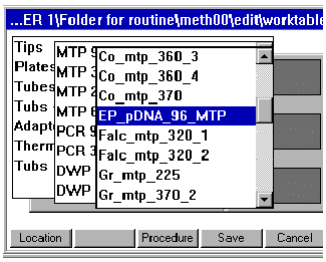


Enter

8. Select plate type.

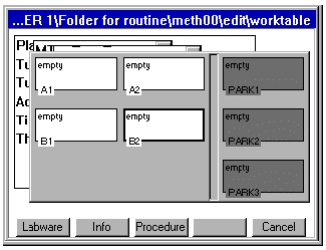
9. Open list of plates

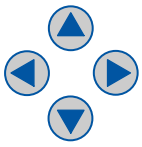
5 Quick Start — Short Instructions



10. Select plate.

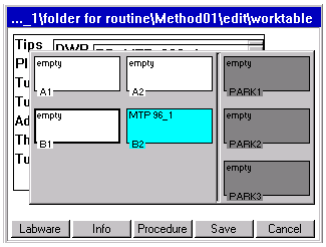
11. Adopt selected plate.



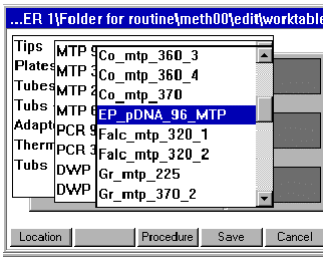


12. Mark location.

13. Position labware.

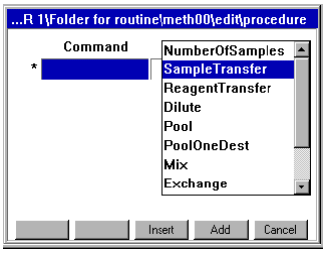


14. Press the **Labware** function key.

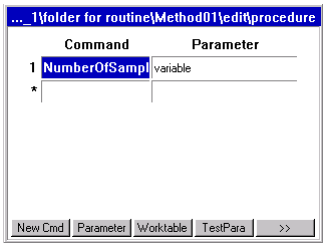


15. Equip worktable as described above and press the **Procedure** several times.

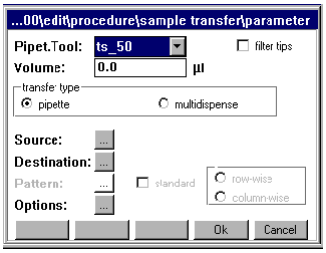
5.1.2.4 Edit procedure (example: Sample transfer)

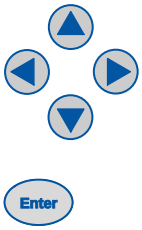


1. Open list of commands.
2. **Sample Transfer** navigation tree.



3. Adopt **Sample Transfer**.
Press the **Parameters** function key.





4. Navigate to the settings, make settings as appropriate.
   - **Pipet. Tool**: set dispensing tool, mark filter tips if necessary
   - **Volume**: enter volume
   - **Transfer type:** select **pipette** or **multidispense**
   - **Source/Destination**: select source and destination
   - **Pattern**: define pattern

   You can set other functions via **Options** .

5.2 Example method

5.2.1 Method objective

Liquid such as a reagent is to be dispensed from a 30 mL reservoir in a Reservoir Rack into 16 wells of a PCR 96 plate. 16 samples from a Thermorack supplied with 1.5 mL Eppendorf micro test tubes are then transferred into the same wells of the PCR 96 plate.

5.2.2 Sample preparation

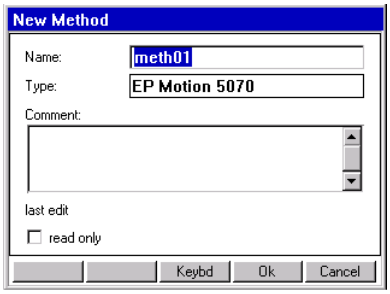
1. Supply the Reservoir Rack with a 30 mL reservoir. Manually fill this reservoir with any volume.
2. Supply the Thermorack with 16 1.5 mL Eppendorf micro test tubes. Put any desired sample volume in these tubes.

5 Quick Start — Example method

5.2.3 Method sequence

5.2.3.1 Log on and create a new method

1. Log on as the user and press **New** to define a new method.

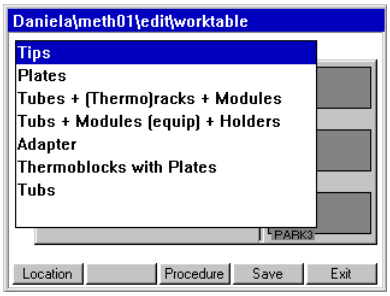


The **New method** window is opened. In this window, you can assign a new method name or adopt the proposed name.

2. Press **OK** to exit the window and return to the navigation tree.

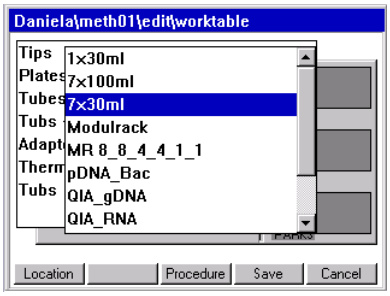
5.2.3.2 Supply the worktable

1. With the method marked, press the **Edit** function key to obtain access to **Worktable** or **Procedure**.
2. Press **Edit** again to open the worktable.

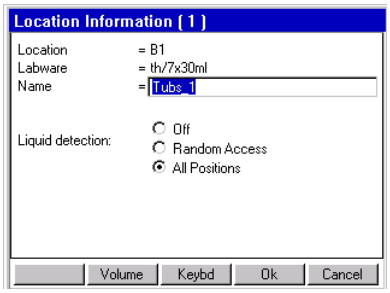


A window appears with a list of predefined labware from which you have to select the tubes necessary for the method.

3. Select **Tubs + Holders** and press Enter to select the Reservoir Rack labware (**7x30mL**).

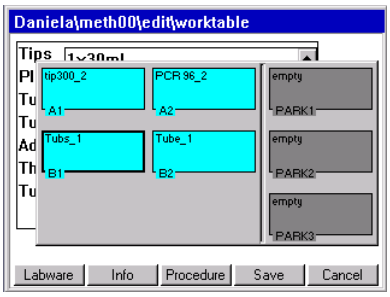


4. Press **Location** to reach the worktable. Mark location B1 with the cursor and press Enter.



The **Location information** window appears, displaying information about the tube which has been positioned.

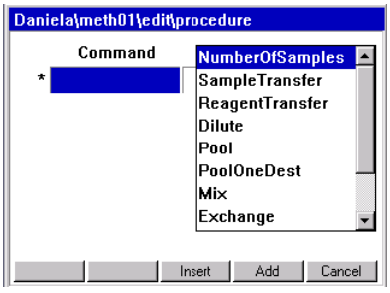
5. Check whether **All positions** is marked for liquid detection by the Optical Sensor. Then press **OK**. Supply the worktable with the appropriate remaining labware.
6. Under **Tips** in the labware list, select the 300 µL tips (**tip300**) and put these in location A1. To confirm and to open the **Location information** window, press Enter. Exit the window by pressing **OK**.
7. Under **Tubes + Racks +Thermoracks** select the Thermorack (**Rack_1_5_mL**) and put this in location B2. Confirm again with Enter and check in the **Location information** window whether **All positions** is selected.
8. Under **Plates** and **PCR 96**, select PCR plate **EP_TT_PCR_150** and position in location A2. Confirm with Enter and check under **Location information** whether **Off** is selected for liquid detection. Liquid detection is very time-consuming for plates with 96 wells.



9. As you supply the worktable, also use the software to organize the actual positioning of vessels on the worksurface.
10. Save with **Save**.

5.2.3.3 Define Procedure

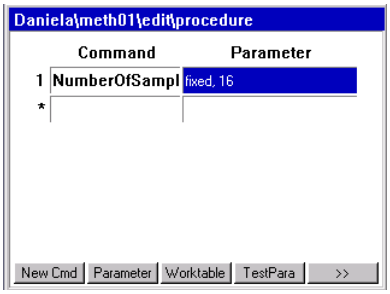
1. Use **Procedure** to reach the programming of the individual commands.



The empty method sequence is displayed with the list of available commands.

2. Select the **Number of samples** command using the cursor. To specify the command as the first method entry in the Procedure, press Enter.
3. Press **Parameter** to reach the parameter settings.
4. Select the **fixed** parameter and enter 16 as the number of samples. Confirm with **OK**.

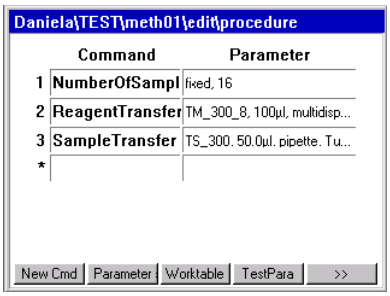
5 Quick Start — Example method



5. Use the cursor to access the second command line. Use the **NewCmd** key to enter the **Reagent Transfer** command. Proceed as described for the **Number of samples** entry. Use the **Parameter** key to make the following settings.
6. **Pipet. Tool**: select TM_300_8.
7. **Volume**: enter 100 µl.
8. Mark **multidispense**.
9. Mark the button next to **Source** and use Enter to open the selection of worktable labware previously specified. Select Reservoir Rack (**Tubs_1**) as the source and confirm with **OK**.
10. Correspondingly use the button next to Destination to select the PCR plate (**PCR96_1**) from the worktable labware list as the destination.
11. Use the button next to **Pattern** to reach automatic pattern specification. **Irregular** may not be selected. The pattern display for the source is displayed.
12. Mark the position with the filled 30 mL reservoir and select by pressing Enter (gray marking turns blue).
13. Press **Destination** and mark the first two columns (row A1 and A2) and confirm with Enter (gray marking turns blue). Exit the pattern by pressing **OK**.
14. Under Options you come to the **Change Tips** setting in which **when command is finished** must be marked. Press **OK** twice to confirm the selection and return to the method procedure.
15. Mark the third command line (under **Reagent transfer**) and press **NewCmd**. Use the arrow keys to select the **Sample transfer** command. Use Parameters to make the following settings.
16. **Pipet. Tool**: select TS_300.
17. **Volume**: enter 50 µl.
18. Mark **pipette**.
19. Mark the button next to **Source** and use Enter to open the selection of worktable labware previously specified. Select Reservoir Rack (**Tubes_1**) as the source.
20. Correspondingly use the button next to Destination to select the PCR plate (**PCR96_1**) from the worktable labware list as the destination.

5.2.3.4 Define pattern and save settings

1. Next to **Pattern**, select the fields **irregular** and then **Source**.
2. Use the button next to **Pattern** to reach pattern specification. The pattern display for the source is displayed.
3. Mark all positions containing sample tubes. After each individual entry, switch between source and destination (see *Specify pattern for command* on page 48). As the irregular input was specified only for the source, the individual wells of the destination can only be selected in the automatic pattern and not at will.
4. Confirm the selection using Enter and exit the pattern with **OK**.
5. Under Options you reach the **Change tips** setting where **before aspiration from next well, tube or position** has to be marked. Press **OK** twice to confirm the selection and return to the method procedure.

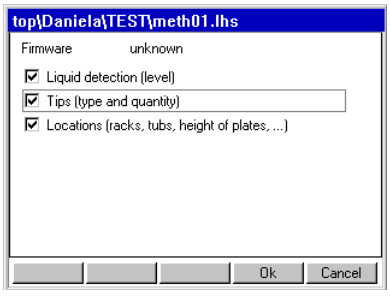


5.2.3.5 Test and Save Settings

1. Check all parameter settings using **TestPara**. In the event of error messages, the incorrect settings need to be corrected.
2. Use **Save** to save the method and then exit editing mode by pressing **Exit**. The user directory is displayed.

5.2.4 Start method

1. Start the method.
   A window with the supplied worktable appears.
2. Use the **Prop.** key to activate all detection functions of the Optical Sensor (if desired) and confirm with **OK**.



3. Press Start again to start the method running.

6 Troubleshooting Error search

6.1 Error search

If a method does not start running after Start, check the following points. Be aware that the labware on the worktable must agree with the method.

- Is plate or rack correctly inserted and not the wrong way round?
- Is a Height Adapter of the correct height being used?
- Front hood completely closed?
- Are all the plates, racks, tips, tubs etc.shown in the display present on the worktable of the instrument?
- 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 described as **empty** in the display really empty?
- Is the waste container empty?

  If there is a bag in the waste container: check that bag has a clean finish and check its clamping ring. The bag must be inserted so that an adequate number of tips can be contained. Furthermore, the bag may not project into locations B1 or A1. The clamping ring must finish flush.
- 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?

6.2 General errors

6.2.1 Read faults by the Optical Sensor

Symptom / message	Cause	Remedy
Read faults by the Optical Sensor when detecting labware	Plates like MTP, DWP, PCR etc.are not level on the surface of the worktable or have been inserted the wrong way round.	▸ Check whether the labware is correctly inserted in the location.
Read faults by the Optical Sensor when detecting labware	The plastic plate is not detected. Cause may be a small unevenness in the surface of the plastic. Most of these kinds of unevenness cannot be detected by eye.	▸ Use a damp cloth to wipe the labware several times in the detection area of the Optical Sensor. ▸ Repeat the **Location** detection with the surface still slightly damp.
Read faults by the Optical Sensor when detecting pipette tips	Problem detecting pipette tips.	▸ Rotate Tip Rack through 180°.
Read faults by the Optical Sensor when detecting liquid level	Surface of liquid not level (thick meniscus formed).	Carefully knock rack/plate on the bench so that the surface is level.
Read faults by the Optical Sensor when detecting liquid level	Bubbles or foam on the surface.	Remove bubbles/foam.

For plates, location is detected at the right-hand edge.
In the case of a **Location** read fault by the Optical Sensor, a display is faded into the control panel which includes the relevant correction option.

6 Troubleshooting Error messages

6.2.2 Dispensing fault

If there is doubt as to the correctness of dispensing, observe the comments about the options in the Appendix and all the comments about the selected liquid type.

6.3 Error messages

All the error messages in the software are issued in English. This applies even if the "German" setting is selected in the software.

In the event of servicing being required, contact the Eppendorf product distributor responsible for you or our local sales office. The addresses of our distributors can be found on our website www.eppendorf.com, the addresses of our sales offices on the penultimate page of this operating manual.

Code	Symptom / message	Cause	Remedy
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 do 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.
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.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
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 the internal or external MMC™ to allocate buffer file or directory.	▸ Make sure that there is enough space on medium. ▸ Either delete some files or (in case of the external card) use another MMC™.
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.
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.
0x0B13	Partition does not exist	• Partition does not exist or has not been initialised.	▸ Make sure that medium has been inserted. ▸ If medium is internal, then reboot and try 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.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
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 dose 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 making directory. Directory exists!	See error message.	▸ Use another name for the new file.
0x0B81	Error making directory. Directory exists!	See error message.	▸ Use another name for the new file.
0x0B82	Error getting fileentries	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.
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.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
0x0C08	Tool dimension unknown	Tool dimension values unknown. Labware outdated or corrupt.	▸ Make sure all labware is of the latest version.
0x0F00	No more user nodes available	All available number of Users is reached.	▸ Delete all Users that are no longer needed.
0x0F01	No more nodes available	The maximum number of nodes (1000) are in use already.	▸ Delete all nodes that are no longer needed.
0x0F02	Wrong instrument type	Files are defective.	▸ If Back-up available: Restore data files (see p. 161), or: ▸ Call local Eppendorf Service.
0x0F03	Initialising EEPROM	Wrong data in hardware of control panel.	If error occurs several times: ▸ Call local Eppendorf Service.
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 initialisation	See error message.	▸ Start program again.
0x1223	Internal critical error	Hardware error. Restart of program impossible.	▸ Call local Eppendorf Service.
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.
0x124C	Time increment in program is too low.	Illegal value has been detected in program.	▸ Check time increment 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.
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.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
0x128B	Carrier: steps lost in x	• Carrier was touched by the user. • Sluggishness in carrier movement in x-axis.	▸ Shutdown and switch off the instrument; if error re-occurs after switching on and re-starting 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.
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	▸ Shutdown and switch off the instrument; if error re-occurs after switching on and re-starting 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.	▸ Shutdown and switch off the instrument; if error re-occurs after switching on and re-starting a method run: ▸ Call local Eppendorf Service.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
0x1295	Carrier: steps lost in z before picking up tip	• Tip was still on pipet 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 cylces 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.
0x129B	Source vessel too small	**Reagent Transfer**: Used source vessel is too small.	▸ Use a larger vessel.
0x12D0	Parameter conflict: Elution volume too large for this tool	Sample transfer with option **elution from filter**: 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.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
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 parameter **elution from filter** in a **sample transfer** command.	▸ Change application.
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. Please switch off power, then switch on again to restart method.	See error message.	▸ See error message.
0x12E9	Tool not locked	This can only happen with the 5070. The tool lock is not properly closed.	▸ Close tool lock.
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.
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 page 20). epMotion 5070 only: ▸ Set **liquid detection** to **off** for racks that are on park positions at the beginning of the procedure.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
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 page 20). ▸ 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.
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.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
0x1513	Position is out of range	The position to be addressed by the tool carrier is outside of its available range. Possible cause: Rack in park position is programmed to be addressed by the dispensing tool.	▸ 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.
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.
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.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
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.
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.
0x1581	Optical sensor: Liquid level could not be detected in location: ...	Error in level detection.	▸ Repeat measurement.
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 page 20). ▸ 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 page 20). epMotion 5070 only: ▸ Set **liquid detection** to **off** for racks that are on park positions at the beginning of the procedure.
0x1900	Program error / system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
0x1901	Loading error	File damaged.	▸ Call local Eppendorf Service.
0x1902	Loading error	File damaged.	▸ Call local Eppendorf Service.
0x1903	Loading error	File damaged.	▸ Call local Eppendorf Service.
0x1904	The following labware has been deleted: ...	Edit mode: The worktable was changed after a 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 re-programmed 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 structureYou 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.
0x190D	The following labware is not selected in node epMotion: ...	Edit mode/worktable: The chosen labware is not available in the labware collection that had been selected for your lab in the software node **epMotion**. Possible cause for this error message: The labware has been de-selected in the **epMotion** node.	▸ Set the respectiv labware in the node **epMotion** in order to select it. This node is accessible for the administrator only (if your lab runs the epMotion by using the "administrator" function).
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.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
0x190E	The following tool is not selected in node epMotion: ...	Edit mode/procedure: The chosen tool is not available in the labware collection that had been selected for your lab in the software node **epMotion**. Possible cause for this error message: The labware has been de-selected in the **epMotion** node.	▸ Set the concerned labware in the node **epMotion** to “select”. This node is accessible for the administrator only (if your lab runs the epMotion by using the “administrator” function).
0x190F	The following liquid is not selected in node epMotion: ...	Edit mode/procedure: The chosen liquid option is not available in the labware collection that had been selected for your lab in the software node **epMotion**. Possible cause for this error message: The labware has been de-selected in the **epMotion** node.	▸ Set the concerned labware in the node **epMotion** to “select”. This node is accessible for the administrator only (if your lab runs the epMotion by using the “administrator” function).
0x1910	The position of the following labware is not available on this worktable The method was written for another workstation configuration	Edit mode/worktable: The chosen labware is not available in the labware collection that had been selected for your lab in the software node **epMotion**. Possible cause for this error message: The labware has been de-selected in the **epMotion** node.	▸ Set the respective labware in the node **epMotion**.
	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	Because you can change the order or contents **Tubs + Modules(equip) + Holders** 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 **Tubs + Modules(equip) + Holders** 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.

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Code	Symptom / message	Cause	Remedy
0x1986	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1A00	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1A01	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.
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".
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 the 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.

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Code	Symptom / message	Cause	Remedy
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.
0x1A13	Program error / system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1A14	Program error / system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
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.
0x1A18	Invalid entry for speed dispense (0.2 ... 110)	Edit mode/parameter in transfer command: A value beyond the allowed range has been entered for the parameter **Speed Dispense**.	▸ Enter a value between 0.2 and 110 mm/sec.
0x1A18	Invalid entry for speed dispense (0.2 ... 110)	Edit mode/parameter in transfer command: A value beyond the allowed range has been entered for the parameter **speed dispense**.	▸ 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.

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Code	Symptom / message	Cause	Remedy
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.
0x1A23	Program error / system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1A24	Program error / system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
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.
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.

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Code	Symptom / message	Cause	Remedy
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.
0x1A60	Program error/system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
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.
0x1A63	Program error / system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1A64	Program error / system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
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 diffferent position.
0x1A71	Program error / system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
0x1A72	Memory insufficient.	Edit mode/pattern: Not enough software memory available for editing the pattern.	▸ Save application and restart system; if error occurs again try to reduce the amount of commands, if possible. In case this is not possible: ▸ Call local Eppendorf Application Support.

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Code	Symptom / message	Cause	Remedy
0x1A73	Delete function only available for last entry	Edit mode/pattern: You may only delete a pattern position that you just entered as long as you did not leave the source (or the destination, respectively).	▸ If you have to delete this position which is no longer available you must edit a new pattern from the beginning (soft-key **New pat.** or **Cancel**).
0x1A74	Memory insufficient.	Edit mode/pattern: Not enough software memory available for editing the pattern.	▸ Save application and restart system; if error occurs again try to reduce the amount of commands, if possible. In case this is not possible: ▸ Call local Eppendorf Service.
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.
0x1A76	8 channel tool cannot be used for this modulrack	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 modulrack 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: If more than one rack is selected as source (or destination) all source (or destination), racks must have the same well pattern (e.g. 96-well plates).	▸ See explanation in "Cause".

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Code	Symptom / message	Cause	Remedy
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: When editing more than one rack as source (or destination, respectively.) the same rack was selected twice.	▸ Select different racks for editing more than one rack as source (or destination).
0x1AC0	Only cycler program possible	Edit mode/in command **Start Cycler**: The selected application must be a cycler program.	▸ Please select a cycler program.
0x1AC1	Program error / system error	Internal program error.	▸ Restart application run or restart system. If error occurs again: ▸ Call local Eppendorf Service.
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.
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 softkey **New pat.**
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".

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Code	Symptom / message	Cause	Remedy
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.
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.

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Code	Symptom / message	Cause	Remedy
0x1C19	Please enter a destination now	Edit mode/pattern: When having selected a source in the command **Sample Transfer** you first have to enter a destination for this source before moving to the next source position.	▸ Press softkey **Destination** and edit the destination position(s) for the selected source position.
0x1C1A	No more positions available (limited by command number of samples)	Edit mode/pattern: Editing further positions is not possible because the limit set in the command **Number of Samples** would be exceeded.	▸ Select a pattern that fits the programmed command **Number of Samples**.
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.
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 goals 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.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
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 goals 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 positons in the pattern. Keep in mind that the selected reagent source positions may not extend beyond one rack.
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 epMotion	The pipet tool you edited in the application was not set on select in node **epMotion** or it has been removed from the node **epMotion** and therefore not available for programming.	▸ Set the tips onselect in node **epMotion**, or edit different tips in the application.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
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: Startvolume greater than filling volume of source tube or well	The parameters **Volume** and **Source** 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: Startvolume greater than filling volume of destination tube or well	The parameters **Volume** and **Destination** 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 parameters **Volume** and **Pipet. Tool** 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 pipet tool.
0x2109	Parameter conflict: Volume too large for this tool	The parameters **Volume** and **Pipet. Tool** 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 pipet tool.
0x210A	Parameter conflict: volume greater than filling volume of source tube or well	The parameters **Volume** and **Source** 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 parameters **Volume** and **Destination** 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".
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 epMotion	The source rack you edited in the application is not set on select in node **epMotion**, or it has been removed from the node **epMotion** and therefore is not available for programming.	▸ Set the rack on select in node **epMotion**, 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".

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
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 epMotion	The destination rack you edited in the application is not set on select in node **epMotion**, or it has been removed from the node **epMotion** and therefore not available for programming.	▸ Set the rack on **select** in node **epMotion**, 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 (can be edited via the button **Options** in the parameter display).	▸ See explanation in "Cause".
0x211C	Liquid type not selected in epMotion	The **Liquid Type** you edited in theapplication is not set on select in node **epMotion**, or it has been removed from the node **epMotion** and therefore not available for programming (it can be edited via the **Options** button in the parameter display).	▸ Set the liquid on select in node **epMotion** or edit a different liquid in the application.
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 parameter **No. of Cycles** 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.

6 Troubleshooting Error messages

Code	Symptom / message	Cause	Remedy
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".
0x2121	Parameter conflict: mixing volume in source too large for this tool	The parameters **Volume** and **Pipet. Tool** 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 pipet tool's volume range.
0x2122	Parameter conflict: mixing volume in source too small for this tool	The parameters **Volume** and **Pipet. Tool** 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 pipet tool's volume range.
0x2123	Parameter conflict: mixing volume in source greater than filling volume of source tube or well	The parameters **Volume** and **Source** 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.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
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 parameters **Volume** and **Pipet. Tool** 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 pipet tool's volume range.
0x2129	Parameter conflict: mixing volume in destination too small for this tool	The parameters **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 parameters **Volume** and **Destination** 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.
0x212C	Parameter conflict: mix after dispense not allowed in multidispense mode	When the parameter **transfer type** is set to **multidispense**, the parameter **mix after dispense** 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.

6 Troubleshooting — Error messages

Code	Symptom / message	Cause	Remedy
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 parameter **Source rack** 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 parameter **Destination rack** 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.
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.
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.
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.
0x2170	Parameter conflict: Parameter elution from filter is only possible when filter plates have been selected as source	To edit the option **elution from filter** a filter plate must have been edited as source.	▸ See explanations in "Cause".

6 Troubleshooting Error messages

Code	Symptom / message	Cause	Remedy
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 option **elution from filter**, 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.
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 an other 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.

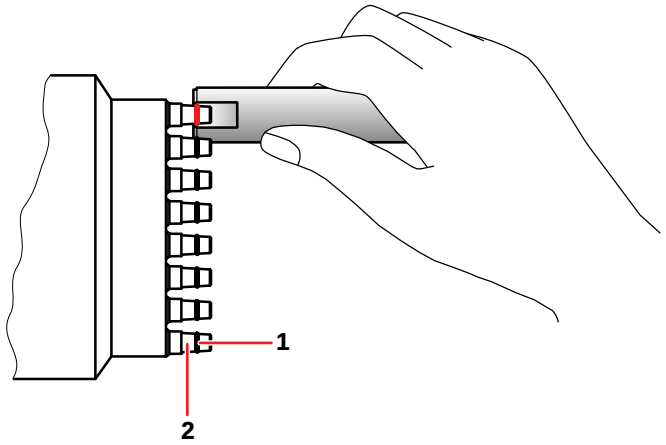
6 Troubleshooting — Error messages

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.

7 Maintenance Service

7.1 Service

7.1.1 Change sealing rings on eight-channel dispensing tool



1 Sealing ring	2 Cone

Caution! 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 sealing rings annually or as required.
Use the auxiliary tool and the plug-on aid from the delivery package for the dispensing tool.

Proceed as follows to replace the sealing rings.

1. Hold up the edge of the auxiliary tool at the level of the sealing ring.
2. Cut through the sealing ring on the dispensing tool using the auxiliary tool.
3. Remove the sealing ring using your fingers.
4. Clean the cones with a slightly damp lint-free cloth.
5. Repeat the procedure for all the remaining sealing rings and cones.
6. Put on the new sealing rings with the aid of the plug-on aid (shortened pipette tip) and position the sealing rings in the depressed grooves of the cones.

7.1.2 Service dispensing tools

Caution! 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 to your Eppendorf AG service partner for servicing.

7 Maintenance Cleaning

7.2 Cleaning

7.2.1 Clean worktable

Caution! Damage from UV radiation.

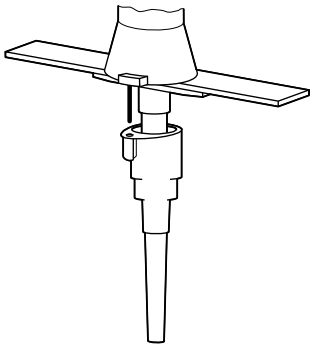
UV radiation can cause color changes to the surface or, in the course of time, cause damage to the moving parts and electronics of the epMotion.

▸ 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.

7.2.2 Clean dispensing tools



1. Remove the ejector of the single-channel tools.
2. Clean the 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.

7.2.3 Clean control panel

▸ Clean the control panel with a mild cleaning agent and a lint-free cloth.

7.2.4 Clean 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.

7.2.5 Autoclave labware

▸ Autoclave the thermoadapter, thermoblock and thermorack for 20 minutes at 121 °C and 1 bar pressure.

7.3 Decontamination Before Dispatch

If you would like to return the dispensing tools to Eppendorf AG or a service partner for checking, repair or calibration, please observe the following.

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. You can find this on our home page www.eppendorf.com in the form of a PDF file.

▸ Decontaminate all the parts you want to dispatch.

▸ Enclose the fully-completed and signed decontamination certificate for returned goods (incl. the serial number of the dispensing tool) with the dispatch.

8 Technical data Power supply

8.1 Power supply

Voltage Fuses Current consumption	100 to 240 V ± 10 % Type T 2.5 AH / 250 V < 1.5 A
Frequency	50 Hz to 60 Hz ± 5 %
Power consumption	max. 80 W
Overvoltage category	II (IEC 610 10-1)
Degree of contamination:	2
Protection class	1

8.2 Ambient conditions

General operation	+15 °C to +35 °C 55 % to 75 % relative humidity up to 2000 m MSL
Storage conditions	-20 °C to +70 °C 10 % to 80 % relative humidity

8.3 Weight / dimensions

8.3.1 Dimensions

Device	
Width	65 cm
Depth	48 cm
Height	63 cm
Control panel	
Width	25 cm
Depth	15 cm
Height	11 cm

8.3.2 Weight

epMotion plus Control Panel	45 kg

8.4 Interfaces

Interface	**Specification**
USB	USB 1.1
Ethernet	Ethernet 100 Mbit/s

8 Technical data — Dispensing tools

8.5 Dispensing tools

Data for free-jet pipetting using double-distilled water. Data evaluation to ISO 8655.
Temperature approx. 20 °C, normal atmospheric pressure.

Dispensing tool	Volume range	Volume	Error			
			systematic (inaccuracy)		random (imprecision)	
			%	µL	%	µL
TS 50	1.0 µL to 50 µL	1 µL 5 µL 25 µL 50 µL	±15 ±5.0 ±1.5 ±1.2	±0.2 ±0.25 ±0.375 ±0.6	±5.0 ±3.0 ±0.6 ±0.4	±0.05 ±0.15 ±0.15 ±0.2
TS 300	20 µL to 300 µL	20 µL 30 µL 150 µL 300 µL	±4.0 ±3.0 ±1.0 ±0.6	±0.8 ±0.9 ±1.5 ±1.8	±2.5 ±1.5 ±0.4 ±0.3	±0.5 ±0.45 ±0.6 ±0.9
TS 1000	40 µL to 1,000 µL	40 µL 100 µL 500 µL 1,000 µL	±5.0 ±2.0 ±1.0 ±0.7	±2.0 ±2.0 ±5.0 ±7.0	±1.5 ±1.0 ±0.2 ±0.15	±0.6 ±1.0 ±1.0 ±1.5
TM 50-8	1.0 µL to 50 µL	1 µL 5 µL 25 µL 50 µL	±25 ±5.0 ±2.0 ±1,2	±0.25 ±0.25 ±0.5 ±0.6	±10 ±5.0 ±1.5 ±0.7	±0.1 ±0.25 ±0.375 ±0.35
TM 300-8	20 µL to 300 µL	20 µL 30 µL 150 µL 300 µL	±10 ±10 ±2.5 ±1.5	±2.0 ±3.0 ±3.75 ±4.5	± 4.0 ±3.5 ±0.8 ±0.45	±0.8 ±1.05 ±1.2 ±1.35
TM 1000-8	40 µL to 1,000 µL	40 µL 100 µL 500 µL 1,000 µL	±6.0 ±3.0 ±1.5 ±0.8	±2.4 ±3.0 ±7.5 ±8.0	±2.5 ±1.5 ±0.3 ±0.2	±1.0 ±1.5 ±1.5 ±1.5

When dispensing the defined errors for pipetting are exceeded.

8.6 Further specifications

8.6.1 Noise level

Noise level	typically 53 dB (A)

8.6.2 Optical Sensor

Optical confugal infrared sensor	Non-contact detection of liquid levels, tools in place, labware surfaces, tip types and quantities
Detection conditions	Surface of liquid must be 90 ± 3° to the optical beam axis. Liquid level at least 3 mm

8 Technical data — Further specifications

8.6.3 Carrier

Working space	
Width X	37 cm
Depth Y	20 cm
Height Z	20 cm
X-Y-Z axis positioning	
Systematic deviation	±0.3 mm
Random deviation	±0.1 mm

8.6.4 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

9 Ordering information Accessory

9.1 Accessory

Use only original Eppendorf accessories or accessories (labware) approved by Eppendorf AG on the epMotion.

9.1.1 Automated pipetting system epMotion 5070

Order No. (International)	Order No. (North America)	Description
5070 000.000		**Automated pipetting system epMotion 5070** Basic device, includes control panel, software, Optical Sensor, waste container, MMC and reader, operating manual 200-240 V, 50/60 Hz, power plug Europe
5070 000.018	960000005	100-130 V, 50/60 Hz, power plug Japan, ROW

9.1.2 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 1000** Volume range 40-1000 µl
5280 000.215	960001044	**8-channel-dispensing tool TM 50-8** Volume range 1-50 µl
5280 000.231	960001052	**8-channel-dispensing tool TM 300-8** Volume range 20-300 µl
5280 000.258	960001061	**8-channel-dispensing tool TM 1000-8** Volume range 40-1000 µl
5075 774.003	960001109	**Holder for 6 dispensing tools**

9.1.3 epT.I.P.S. Motion Pipette tips

Order No. (International)	Order No. (North America)	Description
		epT.I.P.S. Motion 15 x 96 tips in racks
0030 003.942	960050002	1-50 µl
0030 003.969	960050045	20-300 µl
0030 003.985	960050088	40-1000 µl

Order No. (International)	Order No. (North America)	Description
		epT.I.P.S. Motion Filter 15 x 96 filtertips in racks, PCR clean
0030 003.950	960050029	1-50 µl
0030 003.977	960050061	20-300 µl
0030 003.993	960050100	40-1000 µl

9 Ordering information Accessory

9.1.4 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**	**epMotion Reservoir** 10 x 5 pcs. in bags, PCR clean 30 ml 100 ml

9.1.5 Racks for individual test tubes

Order No. (International)	Order No. (North America)	Description
5075 761.009 **5075 775.000** **5075 760.002** **5075 776.006** **5075 792.028** **5075 792.044** **5075 792.001** **5075 792.060** **5075 762.005** **5075 792.087** **5075 763.001** **5075 792.109**	**960002024** **960002156** **960002032** **960002164** **960002377** **960002326** **960002369** **960002334** **960002041** **960002342** **960002059** **960002351**	**Rack** for 24 Eppendorf Tubes, glass or plastic tubes, no temperature control Ø 17 mm x 100 mm max. length Ø 17 mm x 60 mm max. length Ø 16 mm x 100 mm max. length Ø 16 mm x 60 mm max. length Ø 15 mm x 100 mm max. length Ø 15 mm x 60 mm max. length Ø 14 mm x 100 mm max. length Ø 14 mm x 60 mm max. length Ø 13 mm x 100 mm max. length Ø 13 mm x 60 mm max. length Ø 12 mm x 100 mm max. length Ø 12 mm x 60 mm max. length
5075 792.125	**960002380**	**Rack** for 24 HPLC tubes Ø 12 mm x 40 mm max. length
5075 791.005	**960002318**	**Rack** for 96x 1.5/2.0 ml screw cap tubes

9.1.6 Module rack components

Order No. (International)	Order No. (North America)	Description
5075 799.049 **5075 799.065** **5075 799.081** **5075 799.103** **5075 799.120** **5075 799.162** **5075 799.189** **5075 799.146** **5075 799.260**	**960002601** **960002611** **960002620** **960002630** **960002640** **960002650** **960002660** **960002670** **960002680**	**RR Module TC** PCR 0.2 mL PCR 0.5 mL Safe Lock Ø 12 mm Ø 16 mm Ø 17 mm Ø 29 mm Reservoir 30 mL Reservoir 100 mL

9 Ordering information Accessory

9.1.7 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

9.1.8 Additional Accessories

Order No. (International)	Order No. (North America)	Description
5075 014.009	**960000269**	**epMotion Editor** includes editor key, software package for creating and editing methods and for printing out and archiving program sequences on a PC
5075 015.200		**epMotion Editor** additional license
5075 780.003	**960002008**	**MultiMediaCard 16 MB**
5075 753.006	**960002016**	**Waste container**
5075 751.054	**960002391**	**Thermoadapter DWP 96/1** Thermoadapter for Deep Well Plates, 96 wells
5075 769.000	**960002067**	**Thermorack for 24 Safe Lock 0.5 ml tubes, temperature control**
5075 771.004	**960002075**	**Rack for 24 Safe Lock tubes 1.5/2.0 ml, temperature control**
5075 772.000	**960002172**	**Adapter for 25 Safe Lock tubes 0,5 ml**
5075 798.000	**960000301**	**Panel plate, for Control Panel**

9.1.9 Expansion/upgrade kits

Order No. (International)	Order No. (North America)	Description
5075 851.520	**960021033**	**Upgrade kit** for retrofitting a Control Panel version into an PC version

9.1.10 Accessories for PCR/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 767.031	**960002500**	**Thermorack CB 100 µl**
		Thermoadapter for PCR, skirted
5075 787.008	**960002199**	96 wells
5075 788.004	**960002202**	384 wells
5075 789.000	**960002300**	**Thermoadapter FROSTY**
		Thermoblock for PCR
5075 766.000	**960002083**	96 wells
5075 767.007	**960002091**	384 wells
0030 126.530	**960002288**	**CycleLock Starter Set**
0030 126.548	**960002296**	**CycleLock mats, 5 pcs.**

9 Ordering information Accessory

Order No. (International)	Order No. (North America)	Description
		twin.tec PCR Plate 96, skirted
		wells colorless, 25 pcs.
0030 128.648	**951020401**	clear
0030 128.656	**951020427**	yellow
0030 128.664	**951020443**	green
0030 128.672	**951020460**	blue
0030 128.680	**951020486**	red
		twin.tec PCR Plate 96, skirted
		wells black, 25 pcs.
0030 128.800	**951020508**	yellow
		twin.tec PCR Plate 384
		wells colorless, 25 pcs.
0030 128.508	**951020702**	clear
0030 128.516	**951020711**	yellow
0030 128.524	**951020729**	green
0030 128.532	**951020737**	blue
0030 128.540	**951020745**	red
		PCR-Cooler
3881 000.015	**022510509**	Starter Set (1 x pink, 1 x blue)
3881 000.023	**022510541**	Pink
3881 000.031	**022510525**	Blue

All twin.tec plates can be obtained with barcoding on request.

10 Transport, storage and disposal

10.1 Shut down

If you take the epMotion out of use for a prolonged period, please observe the storage conditions (see *Ambient conditions* on page 98).

Perform the following tasks before taking the epMotion out of use.

1. Clean the epMotion and decontaminate the components (see *Cleaning* on page 96).
2. Only have the epMotion transported by Eppendorf AG Service or by authorized service staff.

10.2 Disposal

In the event of disposing of the product, please observe the applicable legal regulations.

Information on the disposal of electrical and electronic devices in the European Community:

The disposal of electrical devices is regulated within the European Community by national regulations based on EU Directive 2002/96/EC pertaining to waste electrical and electronic equipment (WEEE).

In accordance with this, any devices delivered after 13/08/2005 on a business-to-business basis, which includes this product, may no longer be disposed of in household 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.

11 Appendix A: Hardware Labware

11.1 Labware

11.1.1 Introduction

Under the **epMotion** node in the software you have, among other things, a large number of predefined consumables (tubes, pipette tips, plates etc.), racks, holders and tools etc. available as labware. 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. You can find further information regarding available labware components in the product description of this operating manual as well as in the internet under www.epMotion.com. **All information subject to change.**

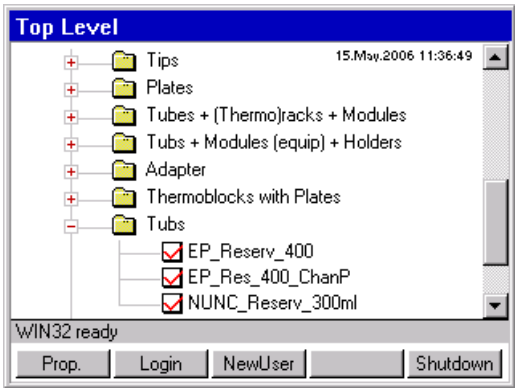


Fig. 14: Labware Selection

With the function key **Prop.** you can display additional product information for selected labware such as article name, information about volumes and order numbers, etc..

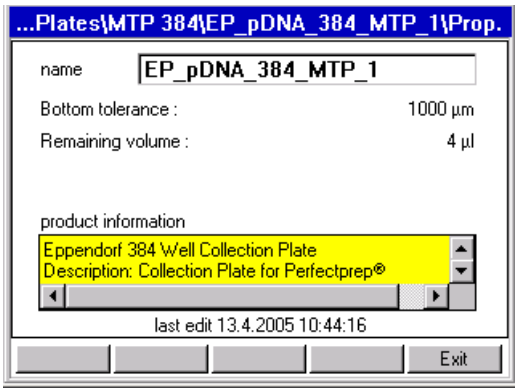


Fig. 15: Product information about a selected item of labware

11 Appendix A: Hardware Labware

11.1.2 Overview of labware

11.1.2.1 epT.I.P.S. Motion

Fig. 16: 1000 µL

Fig. 17: 300 µL

Fig. 18: 50 µL

epT.I.P.S. Motion are single-use tips and are intended exclusively for dispensing tools of 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) as well as with or without filter. epT.I.P.S. with filter are offered in PCR clean purity.

In the labware folder **Tips** you can find the selection of the pipette tips 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).

Caution! 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 rack informs the optical sensor about the volume of the tips and about whether or not these are tips with filters. As the coding is on the two narrow sides of the rack, the rack can be inserted in both directions (rotated about 180° in either direction).

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.

Attention! 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.

11 Appendix A: Hardware Labware

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.

11.1.2.2 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.

11.1.2.2.1 Restrictions

Rack The combination of a rack with a tube type is done by the administrator in the software in the directory**Equip Racks + Modules with Tubes**.

Thermorack The combination of a rack with a tube type is done in the directory **Equip Racks + Modules with Tubes** by the administrator.

Thermoblock The combination of a thermoblocks with a skirted, semi-skirted or unskirted PCR plate is specified in the software. No configuration or change by the administrator possible.

Thermoadapter Thermoadapter 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.

11.1.2.2.2 Racks for reagent reservoir

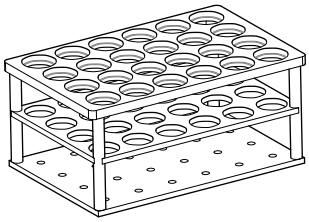


Fig. 19: Rack for 24 reagent tubes

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 positions 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. 123 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.

If necessary, use a spacer to position tubes higher. The spacer is inserted above the bottom shelf.

11 Appendix A: Hardware Labware

11.1.2.2.3 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**.

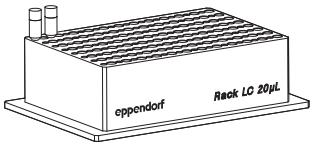


Fig. 20: Rack LC 20 µL

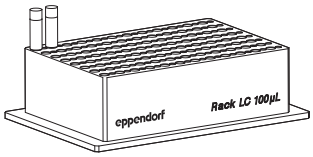


Fig. 21: Rack LC 100 µL

Using the Rack LC

1. Position the Rack LC on the worktable with its label on the front.
2. Select the labware to fill the capillaries from the **Tube plates** labware list.
3. Supply the Rack LC with only one capillary size per method run.

11.1.2.2.4 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.

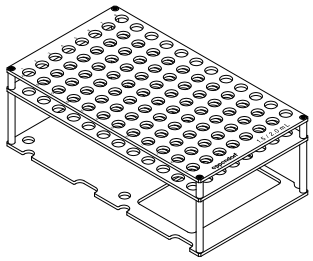


Fig. 22: Rack 96 (Two Location Rack)

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 the 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.

11 Appendix A: Hardware Labware

11.1.2.2.5 Thermoracks

For smaller tubes (e.g. Eppendorf Safe-Lock tubes for 1.5 mL or 2 mL) a thermorack with lid holder which can be tempered and 24 positions is available. The tube lids are held vertical in the holder to the right of the tube bore.

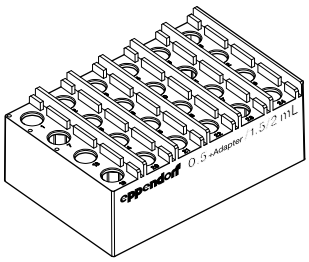


Fig. 23: Thermorack R 1.5 / 2.0 mL and 0.5 mL with adapter

With the aid of 24 adapter sleeves you can also insert into the thermorack R 1.5 / 2.0 mL Safe-Lock tubes with 0.5 mL volume. For use with 0.5 mL tubes, the thermorack is also available with adapter sleeves already fitted.

11.1.2.2.6 Thermoblocks and Thermoracks (96 Wells)

The thermoblock shown is available for 96-well PCR plates (e.g. Eppendorf twin.tec semi-skirted or skirted).

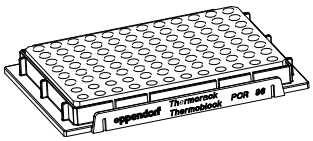


Fig. 24: Thermoblock/Thermorack

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 to a thermorack in the software. The combination of a 0.2 mL tube with the thermorack does not have to be predefined in the software at the factory, this can be done by the administrator in the **Equip Racks + Modules with Tubes** labware folder.

Caution! 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.

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11 Appendix A: Hardware Labware

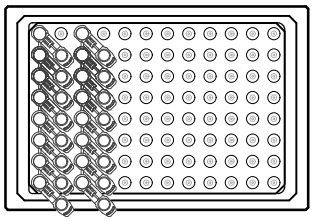


Fig. 25: Tube lid rotated by 45° in relation to the surface of the thermoblock

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.

11.1.2.2.7 Thermoblock (384 wells)

A special 384-well thermoblock is available for PCR plates with 384 wells.

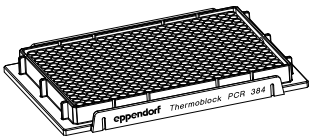


Fig. 26: Thermoblock (384 wells)

Regarding the use of the 384 PCR plate with thermoblock a fixed combination is available in the software just as with the 96-well PCR plates with thermoblock.

11.1.2.2.8 Thermoadapter

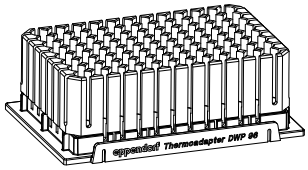


Fig. 27: Thermoadapter DWP/1

Thermoadapters can be positioned in a location with or without a plate at the start of the method. The thermoadapter forms a temporary combination with a plate. The combination is formed when the worktable is edited. In terms of their combination options, thermoadapters are similar to height adapters. A semi-skirted or unskirted PCR plate can only be used on the epMotion in combination with a thermoadapter or 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. 28: Thermoblocks and thermoadapters

11 Appendix A: Hardware Labware

11.1.2.2.9 Cooling action of thermoracks and thermoblocks

The PCR racks are cooled by being stored in the refrigerator (passive cooling).

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.

11.1.2.3 Reservoirs 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.

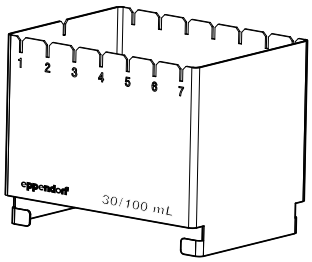


Fig. 29: Reservoir rack

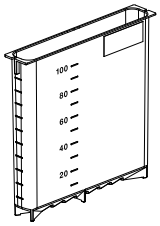


Fig. 30: 100 mL reservoir

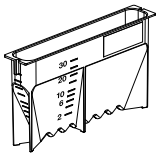


Fig. 31: 30 mL reservoir

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.

For larger volumes, two autoclavable reservoirs with a capacity of 300 mL and 400 mL are available. The remaining volume with these reservoirs is approx. 5 mL.

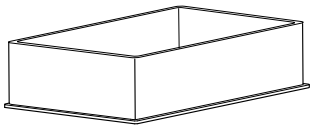


Fig. 32: 300 mL reservoir

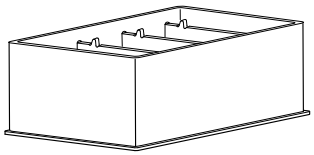


Fig. 33: 400 mL reservoir (Eppendorf)

11 Appendix A: Hardware Labware

11.1.2.4 Reservoir 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.

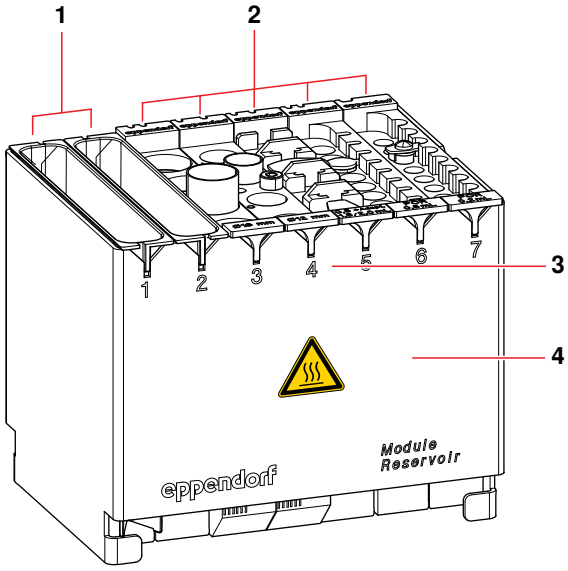
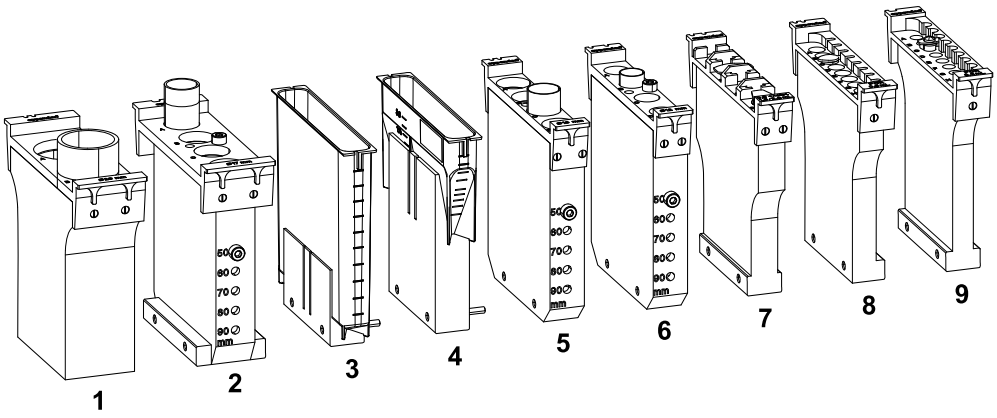


Fig. 34: Supplied reservoir rack

1 Reservoirs	2 Module racks
3 Positions in reservoir rack	4 Reservoir rack

11 Appendix A: Hardware

You can use the following TC (temperature controlled) module racks:



Item No.	Name	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

Insert the module racks square in the rack with the coding facing backwards.

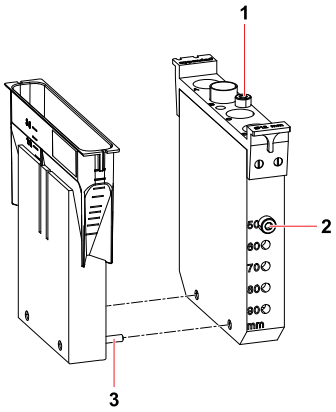
Caution! Material damage as a result of incorrect positioning of module racks.

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.

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.

11 Appendix A: Hardware Labware



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.

The supplied reservoir racks can be positioned in any location with the exception of the A locations.

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-supplied 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.

Caution! Material damage caused by the carrier colliding with the module rack.

- Ensure that Module Rack and tubes do not exceed a height of 123 mm.

Supplied module racks must be created under **Tubs + Modules (equip) + Holders** in the labware list (see Fig. 39 on page 124) before they are used in a method. Predefined files for the reservoirs are already present in the **Tubs + Modules (equip) List** subfolder.

11 Appendix A: Hardware Labware

11.1.2.4.1 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

11 Appendix A: Hardware Labware

11.1.2.4.2 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.

11.1.2.5 Height 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 123 mm. Combinations taller than 123 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.

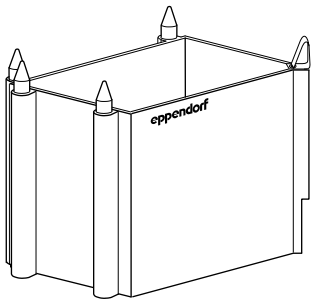


Fig. 35: Height Adapter

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.

11 Appendix A: Hardware Labware

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.

11.1.2.5.1 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.

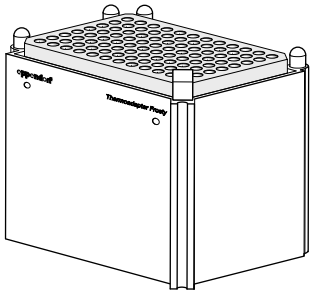


Fig. 36: Modified height adapter and cooling unit or "Frosty Thermoadapter"

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, only select the 85 mm Height Adapter and then a skirted PCR plate for the location. The cooling unit to be used is not named in the software.

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.

11 Appendix A: Hardware Labware

11.1.2.6 Plates

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/deactivate labware or labware combination* on page 124).

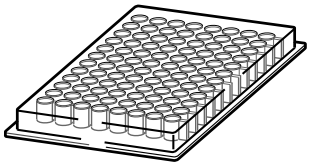


Fig. 37: Microplate (MTP) with 96 wells

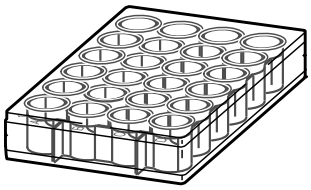


Fig. 38: Microplate (MTP) with 24 wells

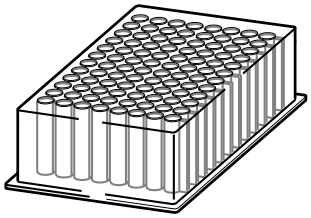


Fig. 39: Deepwell plate (DWP) with 96 wells

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. 11-1: Plates labware folder

MTP 96	Microplate, 96 wells
MTP 384	Microplate, 384 wells
MTP 24 + DWP 24	Micro test plate 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

11 Appendix A: Hardware Labware

11.1.3 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.

11.1.3.1 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

11 Appendix A: Hardware Labware

11.1.3.2 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.

11.1.4 Labware definitions

The following folders are present for labware and labware combinations:

Labware folder/	Content	Description
Tips	Pipette tips	(see p. 107)
Plates	Various subfolders for plates (e.g. MTP 96, Tube Plates)	(see p. 119)
Equip Racks + Modules with Tubes	Combinations of racks, thermoracks and tubes and Safe-Lock tubes and for supplying module racks	(Fig. 20 on p. 109)and (Tab. on p. 112)
Equip Holder with Tubs + Modules	For reservoirs, supplied module racks and the reservoir rack	(see p. 113)and (see p. 116)
Adapter	Height adapters and thermoadapters	(see p. 117)and (see p. 111)
Thermoblocks with plates	Fixed combinations of skirted PCR plates (in which passive 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. 110)
Tubs	Reservoirs with a capacity of 400 mL or 300 mL which can be positioned in a location without an additional holder	(see p. 112)
Tools	Dispensing Tools	(see p. 126)
Liquids	Liquid types which you can select in the parameter selections and **Options**.	(see p. 139)

11 Appendix A: Hardware Labware

11.1.5 Compile your own labware combinations

If you work with administrator and user PINs, only the administrator can compile the labware combinations!
The current labware list can be found at www.epMotion.com
All information on labware are subject to change

The labware combinations are included in the node **epMotion** in folders. You can activate or deactivate labware in the folders.

You can deactivate labware you do not use in the overall labware list. You can also compile your own labware combinations from existing components (e.g. rack/tube combinations) or delete them using the Delete key.

When editing a method, activated labware combinations as well as activated labware are displayed in a list.

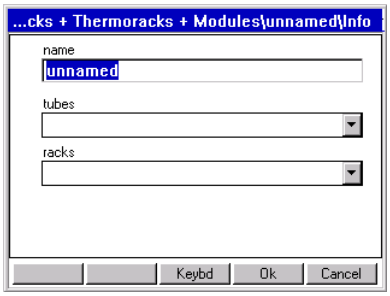
11.1.5.1 Folder for labware and labware combinations and liquids

Beyond the preconfigured standard labware available it is also possible to dimension individual or external labware for use with the epMotion 5070and to incorporate labware directories of the software. For more information on this, contact Eppendorf Service. You can find labware downloads under www.epMotion.com (see p. 106).

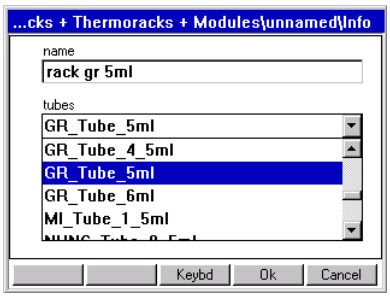
11.1.5.2 Compile a labware combination

Perform the following steps in the sequence described to set up a labware combination.

1. In the navigation tree open the node **epMotion**.
   Different directories are displayed for the different labware components.
   To compile your own labware combinations, e.g. a combination of one rack and 5 mL tubes, perform the following steps.
2. Mark the directory **Tubes + (Thermo)racks + Modules** and press the function key **New**.
   A window for defining the new rack is opened.

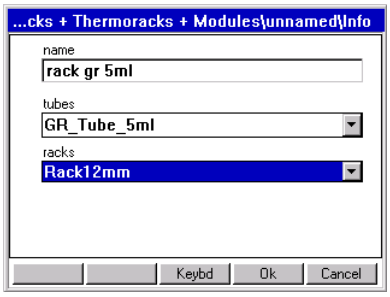


3. Enter a name for the new labware combination.
4. Mark the **Tubes** list and open with Enter.



5. Select the desired type of tube from the list and confirm with Enter.

11 Appendix A: Hardware Labware



The appropriate racks are loaded by the software.

6. Select the rack to suit the tubes from the **Racks** selection list. Racks are shown with a white background, module racks with a pink one.
7. With the function key**Ok** function key.
   The labware combination is filed and is now available in the labware list.

11.1.5.2.1 Supply Module Racks with Tubes

You can find available module racks in **Tubes + (Thermo)racks + Modules** in the subfolder **Thermoracks + Modules List**.

Module racks RR Module TC Ø12 mm, RR Module TC Ø16 mm, and RR Module TC Ø17 mm have transverse bores in which tubes can be positioned at five different heights. Separate labware files are have been created for each of these heights (e.g. "Module TC 12mm", "Module TC 12mm_S50", "Module TC 12mm_S60" etc.). For example the designation _S50 indicates a height of 50 mm, _S60 a height of 60 mm and so on.

Screw the pins into both sides if you are using height adjustment.

Equip module racks with tubes as already described (see Fig. 39 on page 124).

The supplied module racks are displayed under the name you assign them under **Tubs + Modules (equip) + Holders** in the **Tubs + Module (equip) List** directory.

Control whether the newly compiled module racks are selected. The module racks must be selected in order to be available for the supplying of the reservoir racks.

11.1.5.2.2 Occupy reservoir rack with supplied module rack or reservoir

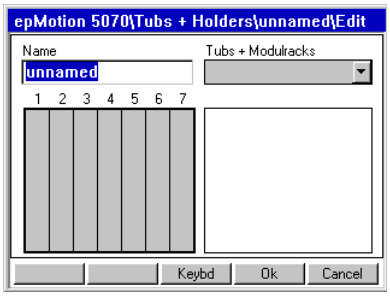
In addition to supplied module racks, various reservoirs are available:

- EP_Reserv_100ml (cannot be temperature-controlled)
- EP_Reserv_30ml (cannot be temperature-controlled)
- Module TC Reserv100ml (can be temperature-controlled, 100 mL reservoir and RR Module TC Reservoir 100ml)
- Module TC Reserv30ml (can be temperature-controlled, 30 mL reservoir and RR Module TC Reservoir 30ml)

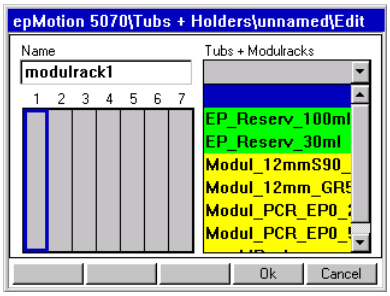
To occupy a reservoir rack with supplied module racks or reservoirs, proceed as follows.

1. Mark the node **epMotion** and open with Enter.
2. Mark the directory **Tubs + Modules (equip) + Holders** and the **New** function key.
   A diagram of the rack appears in the display.

11 Appendix A: Hardware Labware

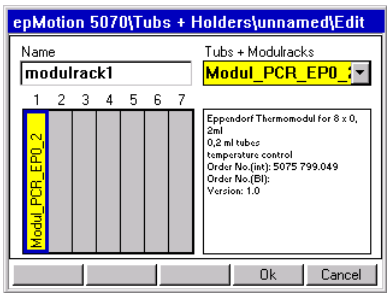


3. Enter a sensible name for the new labware combination.
4. Mark a position in the rack and press Enter.



The list of available, predefined reservoirs/supplied module racks is displayed.

5. Mark the desired labware and adopt it for the marked position by pressing Enter.
   The labware is inserted in the rack and a description appears on the right-hand side.



6. Repeat this process for all other positions supplied.
7. With the function key**Ok** function key.
   The labware combination is filed and is now available in the labware list.

11.1.5.2.3 Activate/deactivate labware or labware combination

- To deactivate the labware: open the desired directory and remove the red tickmarks in front of the labware components with the function key **Unselect** which you do not want to use.
  The deactivated labware components are no longer displayed in the labware list when you are compiling methods.
- To activate labware: open the required directory and with the function key **Select** place a red tickmark in front of the labware components which you want to use.

11 Appendix A: Hardware Labware

11.1.6 Labware list at www.epMotion.com

The labware is continuously maintained and expanded by Eppendorf AG. You can find the current labware list with more than 350 labware folders under www.epMotion.com. where you have the option of downloading labware files in the VIP area. You can then load the labware files into the control panel and print them out. This means you have all the properties of the labware on hand independent of the control panel.

Perform the following steps to download labware from the home page.

1. Carry out backup from the control panel to an external MMC™ (see *MultiMediaCard MMC™ Data Transfer* on page 161).
2. Go to the homepage www.epMotion.com.
3. Click on the "V.I.P." tab. If you do not yet have access data, register.
4. Search the desired labware in the labware area (→epmotion labware search) and apply with "Add" in the selection ("Selection").
   The selection is stored in your User Profile.
5. Click on "Download" to download the selected labware.
6. Save the zip file on your PC.
7. Unzip the file from backup archive: for example, if the die MMC™ has been stored on drive F:\top with the backup, enter F:\ as the drive. Do not use "top" when specifying the drive for unzipping.
8. Transfer the data from the MMC to the control panel. To do this mark the node **Card** and the function key **Labware** function key. Then confirm with **Yes**.
   The end of the update is confirmed with the message **OK**. The labware is now available on your control panel.

11.1.7 Request labware definition

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:

Phone: +49 180 366 67 89

e-mail: support@eppendorf.com

Fax +49 538 01 556 or +49 539 901 25

If the desired type of tube has meanwhile been included in the software, Eppendorf AG will send you the data by e-mail. The data (labware) are then copied into the control panel under the epMotion node at the destination location via MMC™ and card reader.

If we have not yet processed the desired type of tube, you will receive a form containing questions about the labware.

11 Appendix A: Hardware — Tools (dispensing tools)

11.2 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.

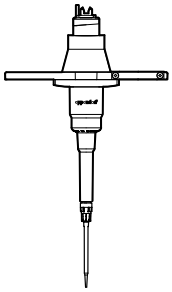


Fig. 40:Single-channel dispensing tool TS 50, volume range 1-50 µL

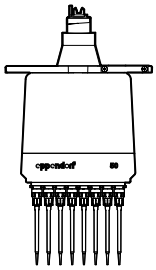


Fig. 41:Eight-channel dispensing tool TM 50-8, volume range 1-50 µL

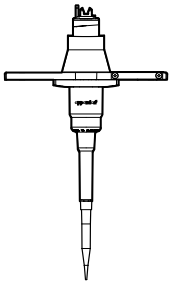


Fig. 42:Single-channel dispensing tool TS 300, volume range 20-300 µL

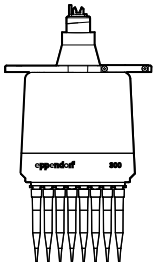


Fig. 43:Eight-channel dispensing tool TM 300-8, volume range 20-300 µL

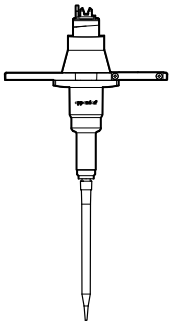


Fig. 44:Single-channel dispensing tool TS 1000, volume range 40-1000 µL

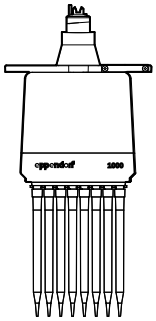


Fig. 45:Eight-channel dispensing tool TM 1000-8, volume range 40-1000 µL

More information about tools can be found in the product description of this operating manual (see *Dispensing tools (Tools)* on page 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 position. The required liquid is aspirated. The carrier then moves the dispensing tool to the first destination position.

11 Appendix A: Hardware Optical sensor

- If in the commands Sample Transfer or Reagent Transfer the version **Pipetting** was selected the entire dissolved quantities of liquid are dispensed in the final position. But with **Multidispense** only a defined subset is dispensed on the particular final position.

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.

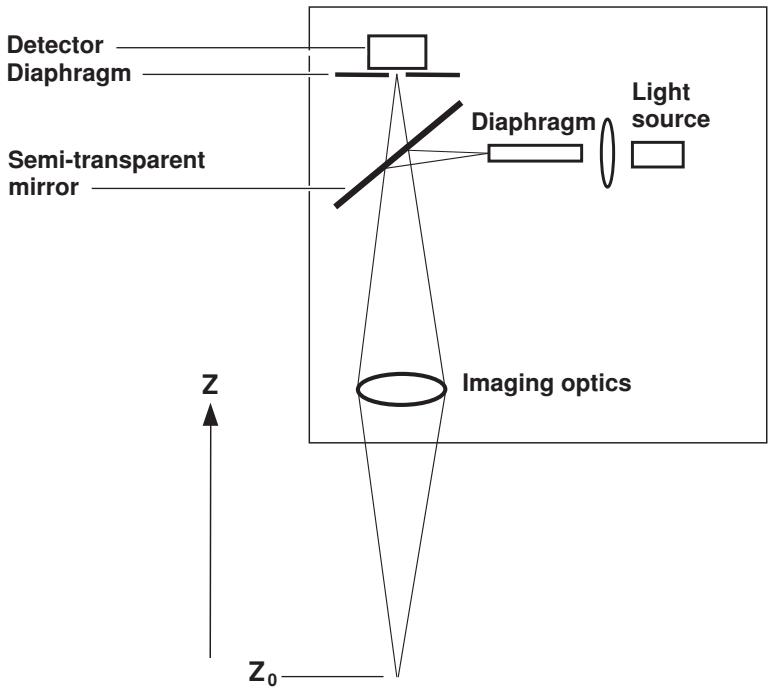
- Depending on the method, other destination positions are possible. The dispensing or transport pattern is likewise specified within the command.
- The number of samples can be entered at the start or specified with priority in the method.
- The time of the pipette tip change can likewise be programmed.
- 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.

11.3 Optical sensor

11.3.1 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.

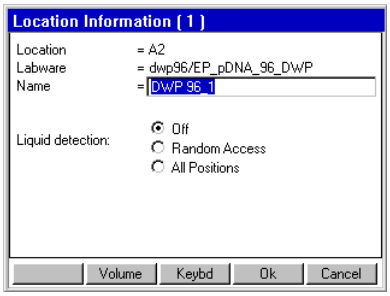
Principle



11 Appendix A: Hardware Optical sensor

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 **Info** function key in worktable mode to switch scanning of liquid surfaces on or off for any marked location:



To switch scanning on or off for all locations, press the **Prop.** function key immediately after starting the method. These changes also apply to Restart.

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.

11.3.2 Detection variant 1: Detect 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** is 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.

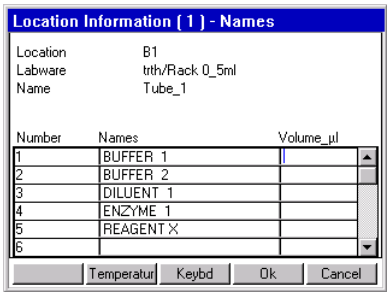
It is not possible to detect filling levels in 384-well plates; it is recommended to only a limited extent for 96-well formats to minimize the time required. Where Number of Samples ≤ 10, only **Off** and **All Positions** are displayed for selection.

11 Appendix A: Hardware Optical sensor

11.3.2.1 Liquid Detection selection options

11.3.2.1.1 Off

If you set the optical sensor to **Off**, 24 individual volumes can be defined for a 24-tube rack, for example.



If you start with the volume entry in the first row, the volume will be adopted for all positions automatically. 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 destinations are not automatically displayed to allow volume check and entry 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.

11.3.2.1.2 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**.

11.3.2.1.3 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.

11.3.2.2 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.

To continue the method, press **Ignore** and then **OK**.

11 Appendix A: Hardware Optical sensor

11.3.2.3 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. Labware that is in the virtual parking positions is excluded from Liquid Detection.

f you would like to specify the volume, exceed the specified minimum volume. To have this specification displayed, press the **Info** function key in worktable mode and then press **Volume**. 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.

If Liquid Detection is switched off, the volume is queried when the method is started.

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.

Liquid Detection can be performed on a labware height up to 107 mm.

The optical sensor cannot be used for Liquid Detection in large tubes (e.g. 15 mL).

11.3.3 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 once 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 it corresponds to the specifications of the worktable of the method to be started.

11.3.4 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.

Location detection can be performed on a labware height up to 107 mm.

11.3.5 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.

The information required is available in the properties for the respective tubes in the software.

The detection limits of the optical sensor for a tube can be viewed on the control panel in the **epMotion** node by pressing the **Prop.** key with the labware marked appropriately.

12 Appendix B: Software Commands, Parameters, Options

12.1 Commands, Parameters, Options

This section includes detailed information about commands and parameters. This information complements the description in the chapter "Control" (see p. 42).

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.

12.1.1 Number of samples

With the command **Number of Samples** specify how many samples are meant to be processed in the successive procedure steps. 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.

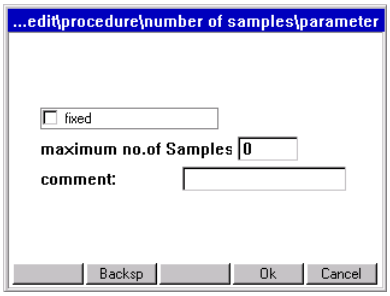
Depending on the command, the maximum number for number of samples results from the plate or rack type in destination or source. For example, the largest value for two 384-well plates is 768.

Further restrictions on the maximum number result from the pattern and the number of tubes per rack or wells per plate. With Sample Transfer, for example, the sum of aspiration positions in the source may be smaller than the sum of dispensing positions in the destination.

According to type and function of the successive commands the **Number of Samples** has different consequences:

- **Sample Transfer**: number of samples which is aspirated from the source plate.
- **Reagent Transfer**: number of wells of the destination 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 plate from which liquid is collected.
- **Mix**: number of wells in the plate in which the liquid is mixed.

12.1.1.1 Define parameters



- **fixed**:

  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 question.
  Deactivate this option if the number of samples at the start of the method is to be entered by the user.
- **maximum no. of samples**:

  At the start of the method, the number entered here is accepted as the maximum input value. When displaying the pattern **the maximum no. of samples** is considered.
- **Comment** is displayed when starting the test and the query **number of samples.**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).

fixed and **maximum no. of samples** are valid until the next command **Number of Samples** in the procedure.

12 Appendix B: Software Commands, Parameters, Options

The **Number of Samples** question is asked first at the start. Is in a procedure **Number of Samples** contained repeatedly, query occurs accordingly often in succession (exception **fixed**).

If part of a procedure in the method is not to be executed, enter "0" as a value.

12.1.1.2 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 as so on. In the case of a 384-well plate, this applies accordingly. 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 each rack there is only one Sample Transfer command in the method in which a rack is defined as source. 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 positions. The maximum number for Number of Samples is 24.
  If in a command a Sample Transfer from two racks is to be extracted and both racks are to be processed in succession, the entry of, for example, 30 would mean that the Sample Transfer in the first rack was carried out completely (24 transfers) and in the second rack six times. 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 Reagent Transfer relates to the destination.
- **Dilute**

  Number of Samples ahead of the Dilute command specifies the number 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 restricting Number of Samples by means of the pattern in a Sample Transfer: if only every other sample is aspirated from a 96-well plate (source), the maximum entry resulting is: 48 (96 : 2 = 48).
  If one sample is aspirated from a 96-well plate (source) and then dispensed twice into another 96-well plate (destination), the maximum Number of Samples is: 48.
  Reason: in this instance, Sample Transfer applies from a source to a destination; so 48 x 2 = 96 applies. However, if a second 96-well plate had been given in the command as the destination, the 96 samples could be transferred both continuously (first all of Plate A, then Plate B) or alternately (Plate A, Plate B, Plate A, etc.). Whether the transfer is continuous or alternating is defined in the pattern of the method.

12 Appendix B: Software Commands, Parameters, Options

12.1.2 Sample Transfer

The command transfers samples from several positions of a source plate to several positions of a destination plate in accordance with the pattern defined for this purpose.

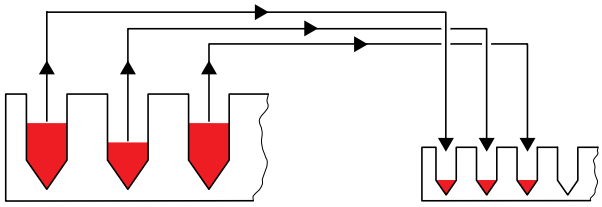
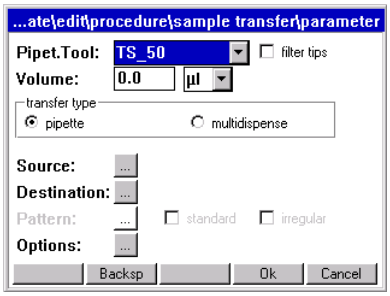


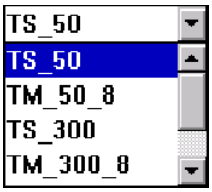
Fig. 46: Diagram of Sample Transfer

The number of samples dissolved from the source plate complies with the preceding Command **Number of Samples**.

12.1.2.1 Define parameters



Pipet.Tool



Select Dispensing Tool The name "TS" (tool, single channel) stands for single-channel dispensing tools whilst "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: Specifies whether tips with filter are used in the test.

Volume For entering volume and selecting µL or nL. With volumes up to 99.9 µL µL, one decimal place is available.

Transfer type **pipette**: Absorption and dispensing of the entered volume.

Multidispense: Dispensing of the entered volume at each 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 multidispense the errors for pipetting are exceeded. (see *Dispensing tools* on page 99).

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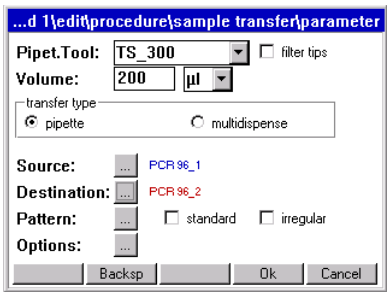
12 Appendix B: Software Commands, Parameters, Options

Source and Destination:

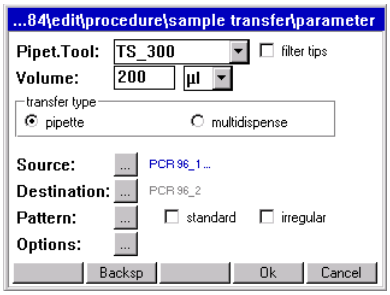
Selection is only possible if the worktable is already defined with labware. When pressing the buttons **Source** or **Destination** the relevant selection lists are displayed. The selection is made using the labware positioned on the worktable. Up to four locations can be selected as source or destination within one command.



Following the selection of source and destination, the labware designations in question are displayed.

You can also dispense within a plate, in which case source and destination are identical.

If the source or destination labware is deleted from the worktable, the labware name is shown in gray in the parameter settings. The source/destination labware has to be respecified, otherwise an error message appears when the method is started.



Pattern:

Define pattern (see *Specify pattern for command* on page 48)You can define pattern with 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.

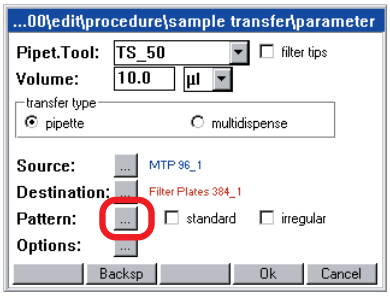
If the labware is changed after the pattern has been entered, the appropriate warning appears when new labware is selected. If the same tube type (e.g. MTP 96) is retained, the pattern can be adopted.

If no destination is specified in the pattern in the case of standard pattern or the pattern with automatic sample detection, the software automatically completes the pattern in the row-wise direction (from left to right).

12 Appendix B: Software Commands, Parameters, Options

12.1.2.1.1 Pattern with automatic pattern detection

Open the pattern display by marking the button next to Pattern and opening it by pressing Enter. The pattern is specified by alternating between source and destination.



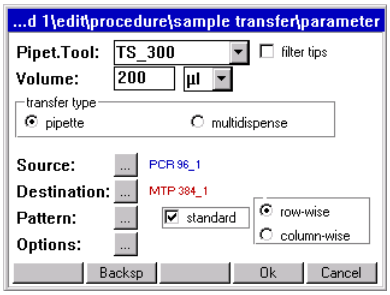
After entry of only the third source and destination positions, the software detects the pattern. The pattern is then completed by the software automatically, so you do not have to specify each aspiration and dispensing position individually.

You can find a detailed example for the entry of the pattern with automatic pattern detection in the control pad (see *Specify pattern for command* on page 48).

12.1.2.1.2 Standard pattern

When specifying a standard pattern, you define row-wise or column-wise processing of the pattern.

The standard pattern is available solely for Sample Transfer.

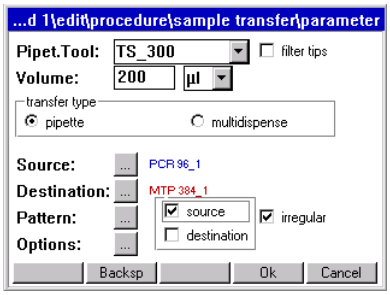


You determine the direction of transfer with **row-wise** (in a row) or **column-wise** (in a column).

If the direction of transfer is not to start from A1, it is necessary to select the Pattern button.

12.1.2.2 Irregular pattern

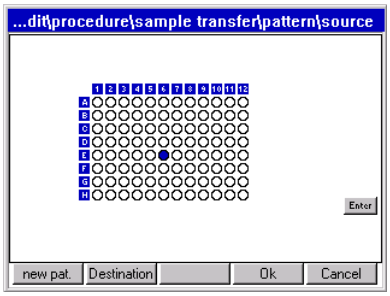
Irregular pattern provides the option of setting aspiration/dispensing positions of the source and/or destination at will. The following example describes specification of an irregular pattern for the source.



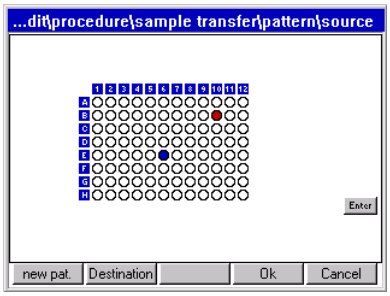
12 Appendix B: Software Commands, Parameters, Options

To define an irregular pattern for the source, proceed as follows.

1. Mark **irregular**. With Sample Transfer and Reagent Transfer also **mark the source** (for all other commands no selection possible or free pattern available; when using the module rack **source** is automatically marked).
2. Mark the button next to **Pattern** and open with Enter the pattern-display.
3. Select a sampling position and then press **Destination**.



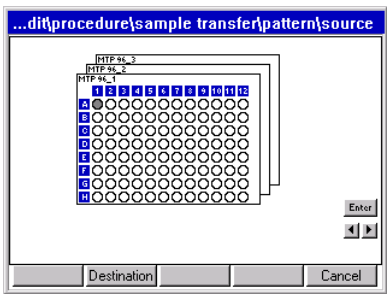
4. Mark the dispensing position(s) and press the button **Source**.
5. Mark the next position at will. Complete the pattern as described.



6. After specifying the pattern press the function key **OK**. The pattern is saved.

12.1.2.3 Pattern with several plates as source or destination

If several plates are available as source and/or destination, the pattern display expands as follows.



The two arrow keys on the right of the display are used to scroll between the labware displayed. Click on the relevant arrow key to do this.

Enter in the display is equivalent to the Enter key on the keyboard.

Begin entering the pattern with the labware displayed in the foreground. The labware is displayed here in the sequence of the source/destination definition. If the same sample or liquid is to be transferred to certain wells of all plates in accordance with the same pattern, then it is necessary only to make the entry for all plates in the display source or display destination for the first transfer. In the second transfer, it is necessary only to make an entry in the first labware of source or destination in each case.

12 Appendix B: Software Commands, Parameters, Options

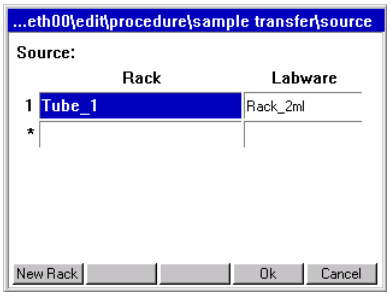
12.1.2.4 Example pattern for several plates

Objective

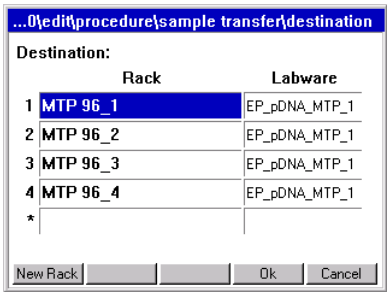
One sample is to be transferred from a 24-tube rack in each case eight times to four 96-well plates. The pattern for one plate is also to apply to the other plates.

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.

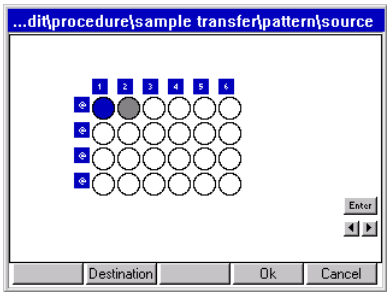
1. Specify the 24-tube rack as source.



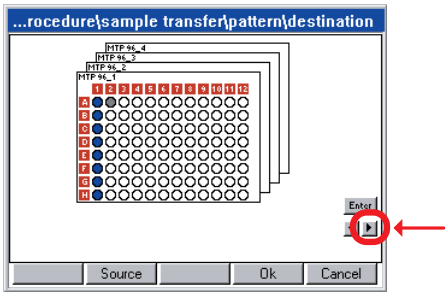
2. Specify the 96-well plates as destination.



3. Define the pattern. To do so, specify one aspiration position of the Source and then press the function key **Destination**.

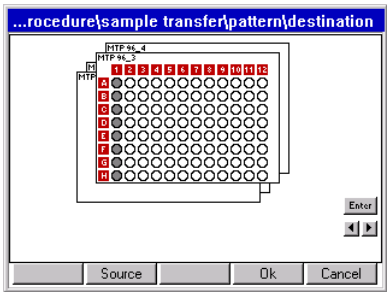


4. Specify the dispensing positions of the destination.



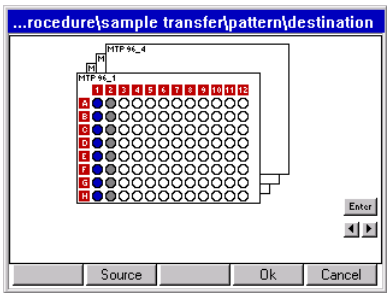
5. Click on the arrow key and switch to the next destination plate.
6. Click on the first well in the second plate.

12 Appendix B: Software Commands, Parameters, Options



The whole column is adopted in accordance with Plate 1 and the third plate is displayed automatically.

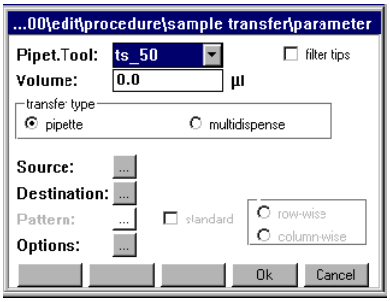
7. Proceed correspondingly for the third and fourth plates.
   The first plate is displayed.



8. Complete the pattern. As you continue, the pattern for the destination only needs entering for the first plate. The pattern is adopted for all other destination plates.

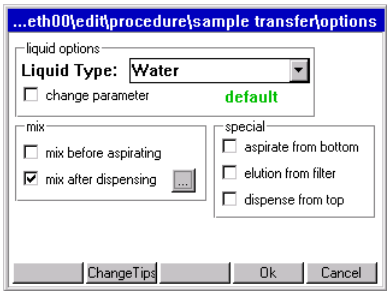
12.1.2.5 Options

Further settings can be undertaken under **Options**.



Press the button next to **Options**.

The options are already predefined with the "Water" liquid type and tip change before aspirating from a new position, so no changes need be made for many standard applications.

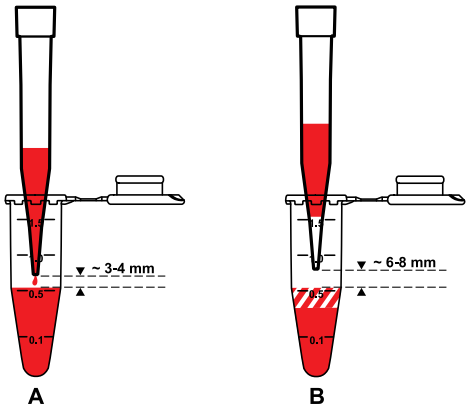


12 Appendix B: Software Commands, Parameters, Options

12.1.2.5.1 Liquid options

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 B

A Dispense 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.	**B Drawing-up Following Aspiration** 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:

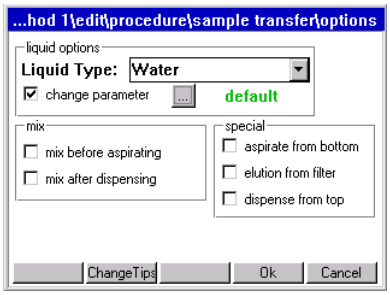
Liquid Type	Dispensing data optimized for	50 µL tip: Pipetting from	50 µL tip: Dispensing from	Remarks
Alcohol 75 %	Mixture of 75 % ethanol and 25 % water	1 to 3 µL	3 µL	Washing reagent in kits for nucleic acid purification. See applications in ep-Folder **Nucleic acid prep**. **Speed Aspiration**: low 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.
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

12 Appendix B: Software Commands, Parameters, Options

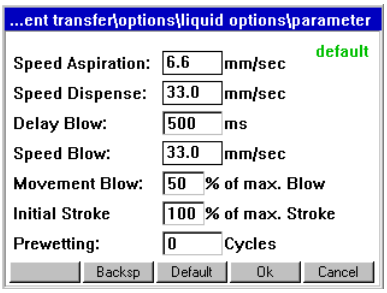
Liquid Type	Dispensing data optimized for	50 µL tip: Pipetting from	50 µL tip: Dispensing from	Remarks
Protein	Water with 1% albumin (10 g/l), 0.01% Triton X-100	5 µL	5 µL	When using a new tip, prewet it with the liquid to be aspirated before the first dispensing operation. Attention! Curvature of the 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) as **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. Is e.g. in combination with **mix** recommended for the reduction of 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 error was determined using this liquid type. Recommended for most methods. **Speed Aspiration**: medium **Speed Dispense**: medium

12 Appendix B: Software Commands, Parameters, Options

Change liquid type parameter



- Mark **change parameter** and then click on the button which appears next to it. The window containing the liquid type parameters is opened.



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 with **default** in the top right of the display. In the event of changes, the display changes from **default** to **changed**. Wit the aid of the function key **Default** the liquid type can be repositioned to the standard parameter.

The variation of **Movement Blow**, **Speed Blow** and **Delay Blow** serves to optimize the dispensing of remaining liquid.

12 Appendix B: Software Commands, Parameters, Options

Tab. 12-2: Liquid type parameters

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	0.10 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.
Initial Stroke	0 to 100 %	Extent of piston during air evaporation, after liquid dispensing has occurred. If **Initial Stroke** is changed, tips are changed automatically for technical reasons.
Prewetting	0 to 9 cycle	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) is with the liquid types **Alcohol 98%**, **Protein** and **ProteinC** preset.

If the optimal setting of **Initial Stroke** is changed, it may lead to cross contamination.

Changes in the liquid types are made at your own responsibility and may lead to a deterioration of the technical data.
Please check the setting regarding the dispensing accuracy for your 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.

12 Appendix B: Software Commands, Parameters, Options

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).

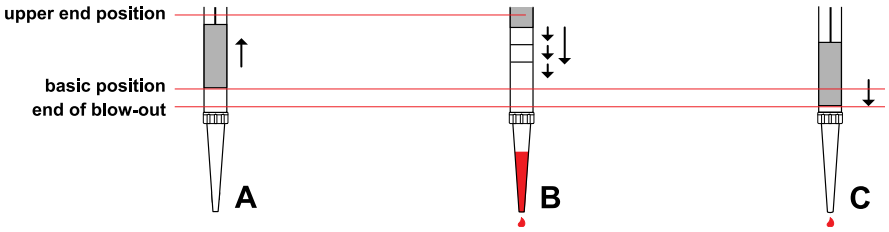
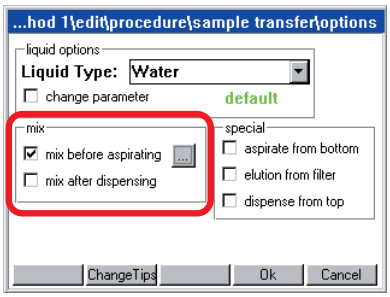


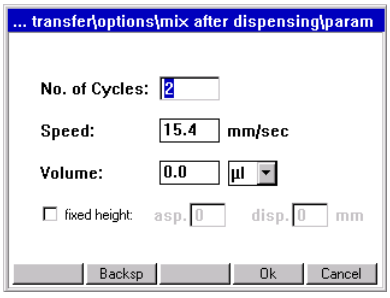
Fig. 47: Aspirate, dispense and blow

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.	

12.1.2.5.2 Mix before aspirating or after dispensing (mix)



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 start is used for mixing in conjunction with **Liquid Type** immersion depth for **mix after dispensing**.

In contrast to all other dispensing steps (free jet), when you dispense with mixing, there is contact with the liquid in the destination. Particular note should be taken of this when setting tip change.

12 Appendix B: Software Commands, Parameters, Options

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 can be viewed in the knot **epMotion** under **Prop.** if the tube is marked accordingly. 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.

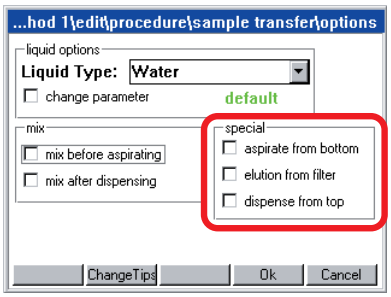
In the case of deviations from the predefined liquid type, determine the optimum mixing speed in trials. Carefully increase mixing speed during these trials. Use very high speeds only for correspondingly viscous solutions. At very high speeds, large volumes and multiple mixing cycles, liquid may get 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 mixing variant **mix after dispensing** can only be used in combination with the dispensing variant **pipette**.

More information on mixing is provided separately (see *Mix* on page 44).

12.1.2.5.3 Immersion depth and dispensing height (special)

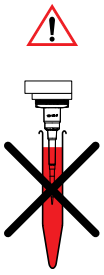


Aspirate from bottom

This version is in particular recommended for small tubes. It is not necessary to scan MTP and PCR plates, if the required volume is much smaller than the existing one.

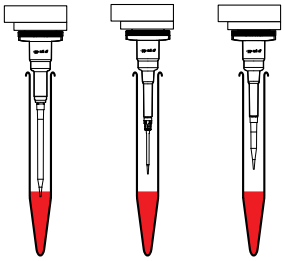
At start only enter a volume for the plate which approximately corresponds to the actual volume and allows for any aspirations and additions which may be required. The volume entered does not affect the position of the pipette tip with **Aspirate from bottom** or **Dispense from top**. To prevent the tubes overflowing during aspiration, the filling level of tubes may not exceed 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 (see *Set Bottom Tolerance* on page 160). 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.



12 Appendix B: Software Commands, Parameters, Options

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 avoid high filling levels on principle.



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 speed version for liquid dispensing in one destination as the z-movement of 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 in particular recommended for the extraction of liquids from appropriate 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 function **elution from filter** refers to the source.

  with the elution function, virtually complete aspiration of the liquid from the filter plate is achieved.
- in the command Sample Transfer under **transfer type** select **pipette**.
- the aspirated liquid is dispensed in the destination.

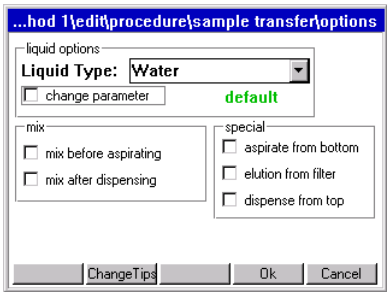
When transporting the liquid, the usual appearance of the liquid in the pipette tip does not apply. There may be air bubbles at several points in the pipette tip. The air segment at the bottom end of the pipette tip may not be clearly pronounced.

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** secures that liquids are dissolved 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**.

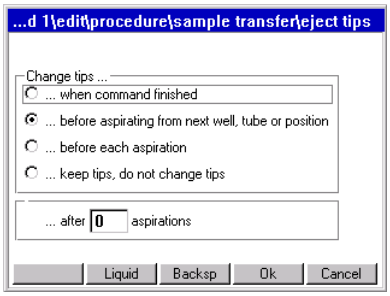
12 Appendix B: Software Commands, Parameters, Options

12.1.2.5.4 Change pipette tips (Change Tips)

You can determine the time that tips are changed. To do so, press the function key **Change Tips**:



The following is displayed:



Change tips ...

- **... when command 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 aspirating from next well, tube or position**
  Tip change before aspirating from a new position. 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 the same source for aspiration is involved. Should always be used with **mix after dispensing** to prevent traces of liquid from a source being entrained as a result of mixing in a destination.
- **... 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 of **keep tips, do not change tips** is selected.

Special features of multidispense:

- With **multidispense** a smaller extra volume must be dissolved.
- **... before aspirating from next well**
  - Extra volume is returned to the old source
  - Change tip
  - Aspirate liquid from new source
- **... before each aspiration**:
  - Extra volume is discarded into the waste
  - Change tip
  - Aspirate liquid from new or old source

12 Appendix B: Software Commands, Parameters, Options

12.1.3 Reagent Transfer

A reagent is transferred from one position of the source labware to several positions of the destination labware. Reagent Transfer is preferably suitable for transferring a reagent to several plates.

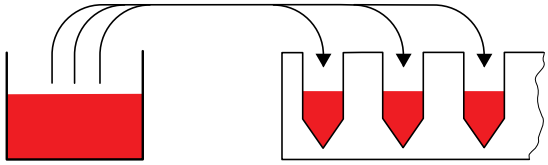


Fig. 48: Reagent transfer principle

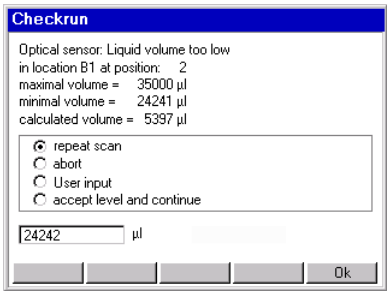
With Reagent Transfer, the Number of Samples entry relates to the destination.

All other entries and selection options are comparable to those of Sample Transfer.

With Reagent Transfer, several source positions with liquid may be present.

12.1.3.1 Special case: use of several sources

For the reagent transfer, you can define methods in which more than one tube is to be defined as the source. 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.



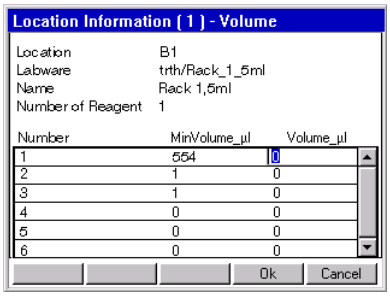
If the optical sensor is switched on, the first source tube is scanned. If, during this process, the software detects that there is too little liquid for the number of samples, the **Checkrun** window appears. The minimum volume, maximum volume and calculated volume are displayed. You can now select 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 scanner also scans empty tubes defined as source 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 level detection is switched off, a request to enter volume appears for the source locations of the pattern. The total volume required is assigned only to the first tube in the entry list. For all other source locations, "1" appears in the left-hand column. The "1" serves as a reminder to assign the individual volumes to the tubes.

12 Appendix B: Software Commands, Parameters, Options



12.1.4 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 Transfer command. 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).

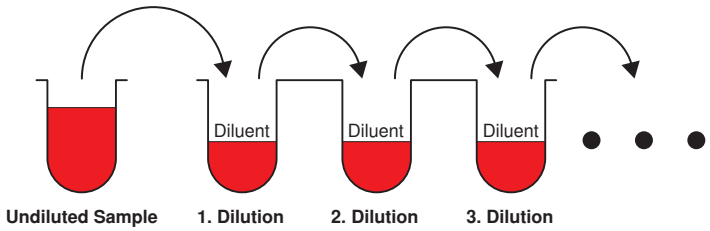


Fig. 49: Dilute command principle (destination plate)

The Number of Samples command ahead of Dilute specifies the number 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, source and destination areas may not overlap on the plate. This can be achieved by limiting the number of samples with the command **Number of Samples**.

To achieve thorough mixing of sample and diluent, 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.

12.1.4.1 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

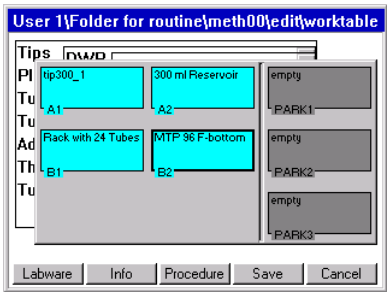
- 24 samples are in a rack with 24 containers and are to be diluted 10:1.
- Dilution takes place in 3 stages with 1:10 dilutions in each case.
  To achieve this, the 24 samples are transferred to a 96-well plate.
- Diluent is transferred from a 300 mL reservoir to the 96-well plate.

Work is performed first with a single-channel dispensing tool and then later, to speed up the process, with an eight-channel dispensing tool.

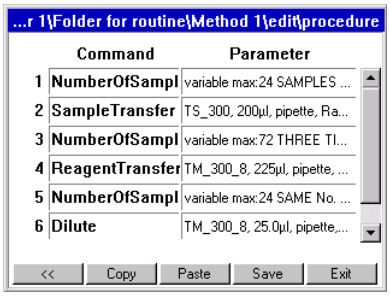
12 Appendix B: Software Commands, Parameters, Options

Method

The worktable might look like this.

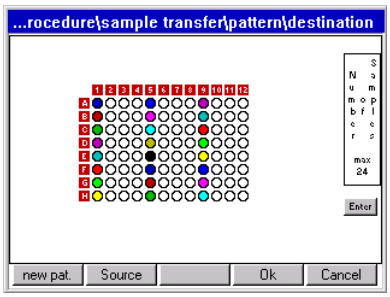


First samples and then diluent should be transferred to the 96-well MTP. The dilutions are performed in the MTP 96. The method was edited under Procedure as follows to achieve this.



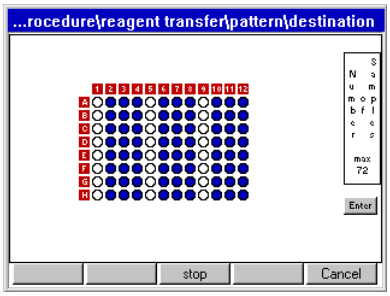
In the command **Sample Transfer** 200 µL sample are respectively put in the micro test plate.

The pattern for the 24 samples in the destination looks as follows:



In the command **Reagent Transfer** the empty wells of the micro test plate are filled with 225 µL diluent. From this point on, an eight-channel dispensing tool executes the task.

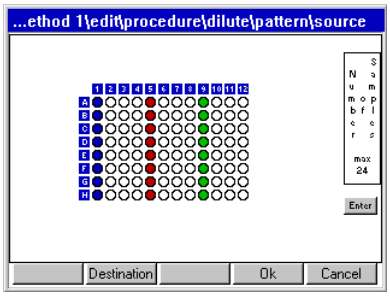
The pattern of the destination looks like this:



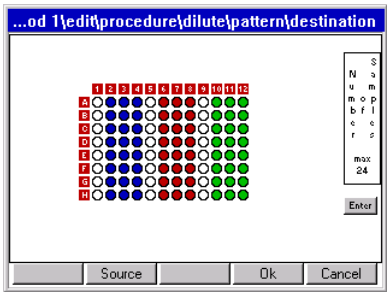
In the sixth **Dilute** command, 25 µL of sample (A-1) are aspirated and mixed with the 225 µL of diluent (e.g. A-2). This is performed three consecutive times (A-3 and A-4). These three dilutions 1 + 9 (1:10) lead to a 1:1000 dilution (MTP columns 4, 8 and 12).

12 Appendix B: Software Commands, Parameters, Options

The call from **show pattern** in the command **Dilute** must show the following pattern for the source:



The pattern of the destination looks like this:



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.

12.1.5 Pool

With the Pool command, you pool liquids from several wells, including from different source positions.

Because with **multiaspirate** following each sample aspiration a drawing-up of the liquid in the tip occurs, the dissolved liquid segments are in the beginning separated by air bubbles. When the tip is full, the contents are dispensed in the destination. You specify in the pattern from which positions of the source you pool for one position of the destination.

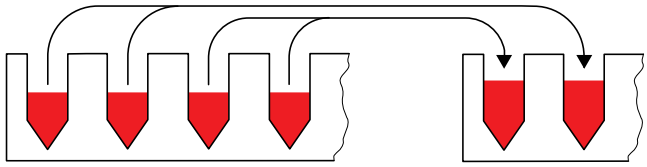


Fig. 50: Pool command principle

12.1.5.1 Define pattern

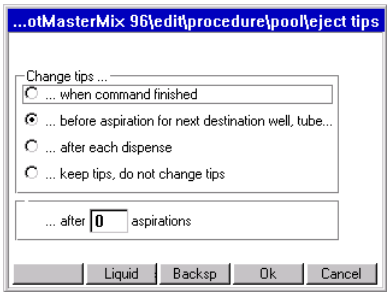
The pattern for the Pool command differs slightly from the pattern for other transfer commands. The following steps briefly describe the special features of the Pool command.

1. In the parameter window of the Command Pool click on the button next **to pattern**.
2. In the Pattern window, click in the desired sequence on the source positions from which the liquid is to be pooled.
3. Click on the function key **Destination** and click in the destination plate on the position where the accumulated liquid is to be dispensed.
4. Switch to source and click on the next sequence of positions from which liquid is to be pooled.
5. In the Destination display, click on the next position at which pooled liquid is to be dispensed.
6. As soon as the pattern is identified, with **OK** function key.

12 Appendix B: Software Commands, Parameters, Options

12.1.5.2 Options

12.1.5.2.1 Change Tips



Change tips ...

- **... when command is finished**
  Tips are changed when the command is finished.
- **.... before aspiration for next destination well, tube**
  Is the default setting. Tips are only changed when the next pool has been assembled for the next destination position.
- **.... after each dispense**
  Means that the dispensing variant **pipette** after the dispensing in a new position the tip is changed.
- **... keep tips, do not change tips**
  A change of **Select pipette** or **multiaspirate** to **multidispense** (or back again) is connected with an increased risk of contamination for the pistons in the dispensing tool. Therefore **keep tips, do not change tips** is disregarded with completion of the pool, if the following command includes the dispensing variant **multidispense**. A tip change is therefore performed.

All other entries and selection options are comparable to those of Sample Transfer.

12.1.5.3 Enter Number of Samples for Pool

The number of samples entry relates to the source. The number of samples divided by "Number of Samples per Destination" gives the number of destination positions. If a decimal place results from the division, the number is rounded up for destination positions. The pattern in the source is likewise completed for the last destination position. 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 carried out in the source until inclusively the position 56 (requirement: no limitation in the command Number of Samples).

12.1.6 Pool One Destination

Use the PoolOneDest command to dispense liquids from several source positions to **one** destination position.

The Number of Samples entry determines the number of positions in which aspiration will be performed. There is only one position as destination.

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.

12 Appendix B: Software Commands, Parameters, Options

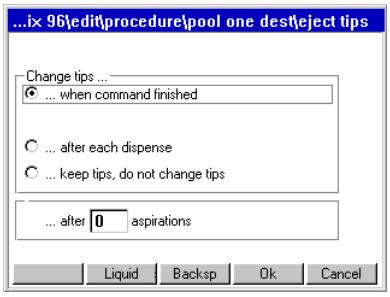
12.1.6.1 Define pattern

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. The positions in which there is to be aspiration and the direction for aspiration steps is specified in the pattern for the source. The destination is then only marked once.

1. In the parameter window of the command click on the button next to **Pattern**.
2. In the Pattern window, click on the first and second source position to specify the direction for pooling liquid.
3. Click on the function key **Destination** and click in the destination plate on the position where the accumulated liquid is to be dispensed.
4. As soon as the pattern is identified, with **OK** function key.

12.1.6.2 Options

12.1.6.2.1 Change Tips



Change tips ...

- **... when command is finished**
  Is the default setting.
- **... after each dispense**
  Only meaningful with the **pipette** dispensing variant. Regarding the dispensing variant **multiaspirate** and the selection **after each dispense** tips are only changed after the dispensing is finished. As with the command Pool the combination **multiaspirate** and **mix before aspirating** with **TestPara** is refused with an error message. Special case for
- **... keep tips, do not change tips**
  A change of **Select pipette** or **multiaspirate** to **multidispense** (or back again) is connected with an increased risk of contamination for the pistons in the dispensing tool. This is why **keep tips, do not change tips** is not observed when finishing the command if the next command contains the **multidispense** dispensing variant. A tip change is therefore performed.

All other settings are comparable with Sample Transfer.

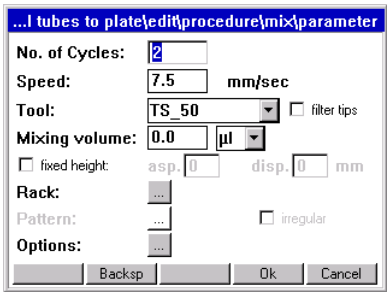
12 Appendix B: Software Commands, Parameters, Options

12.1.7 Mix

Use this command to mix liquids within a position.

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 before aspirating or after dispensing (mix)* on page 143) also apply to this stand-alone Mix command.

12.1.7.1 Recommended mixing speeds (Speed)

Enter the mixing speed in the window **Speed**. 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.

12 Appendix B: Software Commands, Parameters, Options

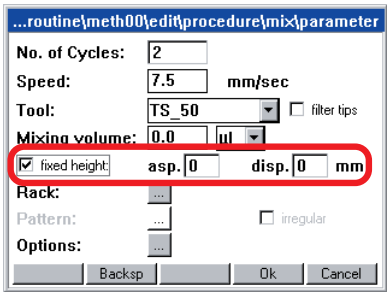
12.1.7.2 Mixing volume

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.

Mark in the node **epMotion** the desired tube and press **Prop.** to display the remaining volume. 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.

12.1.7.3 Mixing functions with fixed height

With **fixed height** a mixing process with 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 field **asp.** a correction of approx. 2 mm in an upward direction. The correction depends on tube type and the tolerances of the tube type.

If you select a height for **disp.** which is above the tube dispensing is automatically reduced 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.

12.1.7.4 Define pattern

The pattern for the Mix command differs slightly from the pattern for other commands. The following steps briefly describe the special features for the Mix command.

1. In the parameter window of the command click on the button next to **Pattern**.
2. In the Pattern window, click one by one on the rows of wells in which the Mix command is to be performed.
3. As soon as the pattern is identified, with **OK** function key.

12.1.8 Exchange

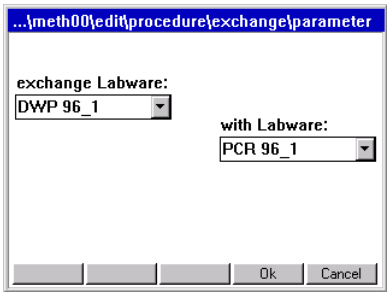
This command is used to switch labware to the location in the current method.

The request to replenish identical tip racks (identical volume, with/without filter) is made automatically by the program, so no more tip racks of the same type need to be positioned in the parking positions.

Labware placed on the worktable from the parking positions within a method is not scanned by the optical sensor.

12 Appendix B: Software Commands, Parameters, Options

12.1.8.1 Define parameters

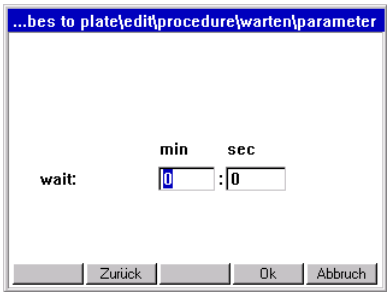


There are 2 selection lists to enable you to view the labware on the worktable and in the parking positions. Selection enables Exchange for subsequent commands. When the method is started, at the request Exchange the location in question is displayed in addition to the name of the labware.

An alternative to **Exchange** is splitting into various part-methods. This would also allow liquid detection by the optical sensor for the labware to be used subsequently.

12.1.9 Wait

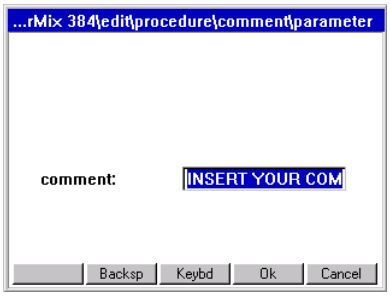
Use the Wait command to insert a pause in the method, e.g. to take account of temperature control periods between two additions of reagent.



The duration of the pause is specified in the parameter settings.

12.1.10 Comment

Use the Comment command to display a comment at a certain point during execution of the method.



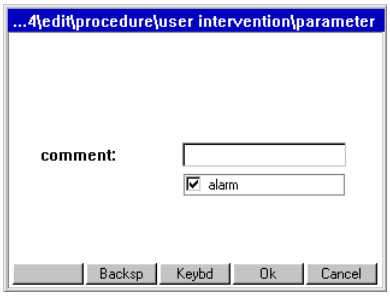
The comment command entered is shown marked as a command line during the method run, no separate window is displayed.

The comment may be up to 15 characters long.

12 Appendix B: Software Administrator rights

12.1.11 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 field **comment**.

For methods with external steps which lead to a change in volume, divide these into 2 methods.

The following things must not at all happen 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.

12.2 Administrator rights

As administrator, you can perform additional activities on the epMotion 5070.

- Specify administrator PIN; recommended when you first start (see *PIN Function* on page 157).
- Create, edit and delete user accounts (see *Create and edit a user account* on page 158).
- Have unrestricted access to all user directories and edit or delete the methods stored in them.
- Deactivate labware which is not required from the full list of available labware (see *Activate/ deactivate labware or labware combination* on page 124).
- Compile your own labware combinations from existing components, e.g. rack/tube combinations (see *Compile a labware combination* on page 122).
- Perform different system functions (display available system memory, change date/time and country settings, activate or deactivate acoustic alarm and PINs).

As a user, you can adjust display contrast and export logfiles.

12 Appendix B: Software Administrator rights

12.2.1 PIN Function

If you are working with the PIN function, system settings and administration of user accounts is reserved for the administrator .

Caution! Loss of data due to misuse or loss of administrator PIN.

The administrator PIN protects the system from undesired access to its configuration and to the stored data of all users.

- Make a note of the administrator PIN and keep it in a safe place. If you lose the administrator PIN, contact Eppendorf Service.
- Allow access to the administrator PIN only to persons who are allowed to edit the configuration of the system and who have the knowledge required to do this.

12.2.1.1 Initial start – set administrator PIN

At the initial start of the epMotion 5070, you can set an administrator PIN to protect the system from undesired access.

Perform the following steps in the sequence described.

1. Switch on the epMotion 5070 at the mains switch.
   The control panel switches on automatically and the software is loaded.
   After loading, the **Input Admin PIN** window appears in the display of the control panel.

   Until you set an administrator PIN, this window appears every time you switch on .
2. Enter the desired administrator PIN using the numerical keys on the control panel. The PIN can be between 4 and 8 digits long.
   Delete any incorrectly-entered PIN using the **Delete** key and repeat PIN entry.
3. For confirmation, enter the PIN in the **Confirmation** field once again.
4. Confirm with the **OK** function key.
   The navigation tree appears in the display of the control panel.
   You are now logged on as the Administrator and can edit the configuration settings of the epMotion 5070.
   Detailed information about the navigation tree and operation of the control panel is given separately.

12 Appendix B: Software Administrator rights

12.2.1.2 Change administrator PIN

As the administrator, you can change the administrator PIN at any time.

Perform the following steps in the sequence described.

1. Switch on the epMotion 5070 and log on as the Administrator.
2. Mark the **System** node in the navigation tree.
3. Press the **Prop.** function key.
   The **System Properties** window appears.
4. Enter the new administrator PIN using the numerical keys on the control panel.
   Delete any incorrectly-entered PIN using the Delete key and repeat PIN entry.
5. For confirmation, enter the PIN in the **Confirmation** field once again.
6. Confirm with the **OK** function key.
   The new administrator PIN takes effect immediately.

12.2.1.3 Change user PIN

You can change the PIN for logging into your User Account at any time. To do this, proceed as follows.

1. In the navigation tree, mark your own User Directory.
2. Press the **Prop.** function key.
   The **User Properties** window appears.
3. Enter the new user PIN using the numerical keys on the control panel. The PIN can be between 4 and 8 digits long.
   Delete any incorrectly-entered PIN using the Delete key and repeat PIN entry.
4. For confirmation, enter the PIN in the **Confirmation** field once again
5. Confirm with the **OK** function key.
   The new User PIN takes effect immediately.

12.2.2 User accounts

12.2.2.1 Create and edit a user account

User names can only be assigned once.

If the epMotion 5070 is used by several people, you can set up an individual user account for each user.

Perform the following steps in the sequence described.

1. In the navigation tree, mark the top node - **Eppendorf**.
2. Press the **NewUser** function key.
   The **New User** window appears in the display.
3. Enter a name and a PIN for the new user. Repeat the PIN in the **Confirmation** field to confirm it.
4. Confirm with the **OK** function key.
   The new user account is set up. A new user directory for this user is created in the navigation tree.
   The user can now log on with his or her PIN at any time.
5. To edit an existing user account, mark the user directory in the navigation tree and press the **Prop.** function key.
   The **User Properties** window appears in the display. You can now alter the settings for the user account and confirm them with the **OK** function key.

12 Appendix B: Software Administrator rights

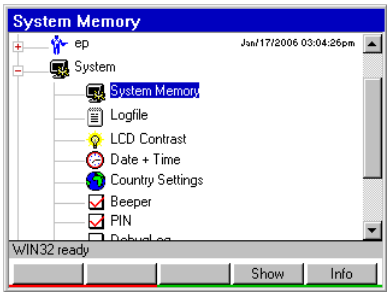
12.2.2.2 Delete user account

Perform the following steps in the sequence described.

1. Mark the user directory in the navigation tree and press the **Delete** key.
   A question appears in the display, asking whether you are sure you wish to delete the user.
2. Confirm with the **OK** function key.
   The user account is deleted.

12.2.3 System settings

System settings are altered in the **System** node. Open the node to make the following settings.



Display Available System Memory	• Mark **System Memory** and press the **Show** function key. System memory is faded into the bottom of the display in the form of a red-and-green mark (red for used memory and green for free memory). • To remove the display, press the **Show** function key again.
Adjust Display Contrast	1. Mark **LCD Contrast** and press the **Set** function key. 2. Adjust contrast using the **---** and **+++** function keys and confirm by pressing **Exit**.
Change Date and Time	1. Mark **Date + Time** and press the **Set** function key. 2. Set date and time and confirm with **OK**.
Change Country Settings	The country settings are classified by international telephone dialing prefix (e.g. 001 for the US). In the country settings, you set the language and how date and time are displayed (12 or 24-hour format). 1. Mark **Country Settings** and press the **Set** function key. 2. Select the desired settings and confirm with **OK**. The epMotion 5070 is shut down immediately. The modified settings apply after the next start.
Activate or Deactivate Acoustic Alarm	• Mark the option **Beeper** and activate/deactivate. • If there is a red tick, the acoustic alarm is activated.
Activate or Deactivate PINs	The **PIN** option is used to specify whether work is carried out with or without entry of a PIN. • Mark the option **PIN** and activate/deactivate. • The epMotion 5070 is shut down immediately. The modified settings apply after the next start.

12 Appendix B: Software Administrator rights

12.2.4 Set Bottom Tolerance

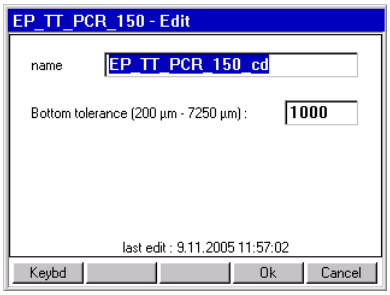
Bottom tolerance describes the distance between the calculated bottom of the tube and the calculated lowest part of the pipette tip. The default setting for bottom tolerance for the majority of tubes is 1 mm. For some reservoirs, it is 2.5 mm.

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.

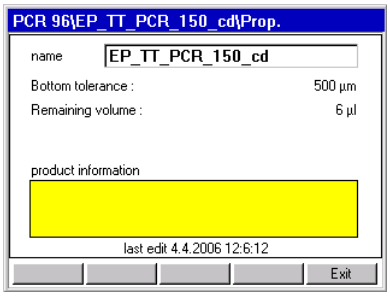
In the case of special tasks, for example removing liquids from above a pellet, it is recommended that the factory-set bottom tolerance be increased. The user has sole responsibility for the correctness of dispensing and for straightforward aspiration in the case of tubes with altered bottom tolerance.

Change bottom tolerance

1. Mark the desired labware in the **epMotion** node and press the **Edit** function key.
2. Enter the bottom tolerance between 200 µm (0.2 mm) and 50 % of tube height. If required, change the specified name using the addition "cd" (change directory). Then press **OK**.
   The main navigation is displayed and the changed labware is marked.



3. Press the **Prop.** function key.



   The new values for the labware are displayed. The product information from the original labware file is not included.

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 may 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 meaningful to reduce bottom tolerance with such plates.

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12 Appendix B: Software Manage and Backup Data

12.2.4.1 Volume Check

To check the remaining volume of a tube, you should edit a method in which a small volume is aspirated from this tube step by step. Observe from which aspiration step too small a volume is aspirated into the pipette tip. The volume remaining in the tube and the last (defectively) aspirated volume combined give the approximate remaining volume. If remaining volume is considered too high, bottom tolerance can be reduced a little in the tube file. Bottom tolerance may not be selected to be so small that a pipette tip contacts the bottom.

Perform the test run as follows.

1. Select a Sample Transfer with 10 replicates for dispensing, for example, so as to be able to aspirate 10 times from the same tube/well.
2. Select **pipette** as the liquid transfer method and deactivate the Optical Sensor for level detection.
3. Under **Options**, select the **aspirate from bottom** parameter to ensure that the tip is always immersed to the bottom of the tube. With **aspirate from bottom**, the selected bottom tolerance of the tube or well always applies.
4. Select a liquid similar to that being used in practice so as to imitate effects like typical curvature of the surface of this type of liquid.
5. Start the method.

12.3 Manage and Backup Data

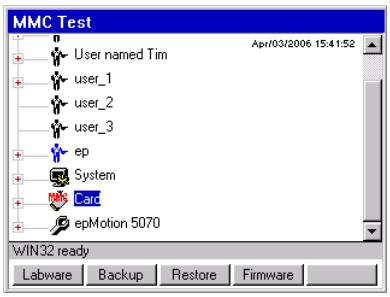
12.3.1 Backup Data

When you perform a backup of the data on the control panel, the program version and all labware specifications from the **epMotion** node, including liquid types and applications from the **ep** node in the epMotion 5070 memory, are copied to the MMC™.

Proceed as follows.

1. Ensure that there is an MMC™ in the slot on the right of the control panel.
2. Mark the **Card** node in the navigation tree.
3. Press the **Backup** function key.
   A question appears, asking whether you want to perform a data backup.
4. Press the **Yes** function key.
   The methods and labware specifications are written to the MMC™.

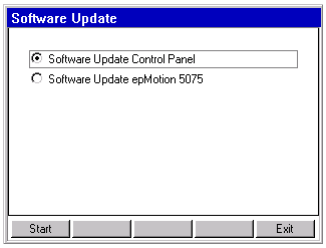
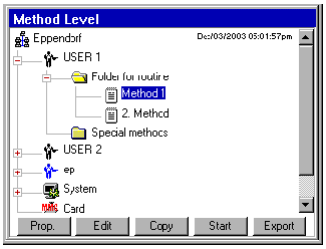
12.3.2 MultiMediaCard MMC™ Data Transfer



The function keys in the above display show the administrator's data transfer options. Users can only perform a backup here.

Insert the external MMC™ on the right-hand side of the control panel and mark the **Card** node.

12 Appendix B: Software

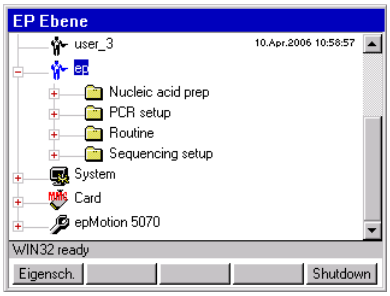
Labware	Labware controls the update of files (e.g. for new tubes or methods).
Backup	Backup includes backing up the program version, the labware in the **epMotion** node including liquid types and applications in the **ep** node, to an external MMC™. With a backup, the external MMC™ is formatted. The data backed up externally using the Backup function can be restored to the internal MMC™ using the Restore command.
Restore	Use Restore to transfer the version of the program stored on the external MMC™ and the associated data to the epMotion and the control panel. After that, only the data transferred using the Restore command are available in the control panel.
Firmware	 The device software update is launched using the **Firmware** function key. After pressing the **Firmware** function key, a display appears. In this display, select whether you would like to carry out an update for the control panel or epMotion software. The control panel update must always be performed first. Shut down the epMotion. To do so, press the **Shutdown** function key. A current backup should always be performed immediately after an update of labware or firmware
Export	 The Export function can be reached by marking a method. This function is used to export the method parameters using a PC and "epMotion Editor". Proceed as follows to perform an export. 1. Plug the MMC™ into the slot on the right of the control panel. 2. Open the **System** node in the navigation tree. 3. Mark **Logfile** and press the **Export** function key. The logfile is copied to the MMC™. Do not use MMCs™ used for export for Restore or other data transfer operations to the internal MMC™ of the control panel.

12 Appendix B: Software Predefined methods

12.4 Predefined methods

In four sub-folders, the **ep** node contains several applications which you can copy into your user directory, where you can edit or start them.

Methods contained in **ep** cannot be started or edited directly there.



This section gives you an overview of the available applications and a brief description.

For detailed information about the applications in the following list and for further applications, see"Applications" at www.epmotion.com.

To improve your understanding of the descriptions, you should have the content of a method displayed. To do this, mark the method and then click the **Show** function key.

12.4.1 Nucleic acid prep

PDNA1	Method PDNA1 comprises Steps 1 to 8 of the Perfectprep, Plasmid 96 VAC DB method. For further steps in this method, see PDNA2 (below). Four transfer commands. Reagents for the test kit can be found in 6 reservoirs (30 mL) in the reservoir rack. Use reservoirs 1 to 3. Fill the destination plate as a function of the entry under Number of Samples. Use dispensing tool TM 1000-8. Then external step (vacuum manifold).
PDNA2	Continuation of method PDNA1. Steps 8 to 16 of the Perfectprep, Plasmid 96 VAC DB method. Reagent from reservoirs 4 to 6. Dispensing Tool TM 1000-8. Use the parking positions and the Exchange command. Wait command for maintaining incubation times. **Note** The method is supplied for the epMotion 5075 VAC as a fully-automatic sequence.

12.4.2 PCR Setup

Module rack A	Method for filling a PCR plate with 8 different DNA samples and 12 different primer pairs from a supplied reservoir rack.

12.4.3 Routine

10 ml tubes to plate	Uses a 16 mm rack with 10 mL tubes (tubes with a pointed bottom and screw top) to fill a 96-well twin.tec PCR plate row by row four times.
384 to 4x96	Sample Transfer from a 384-well plate to four 96-well plates. Execution with an eight-channel dispensing tool.
4x 24 to 96	Sample Transfers from four thermoracks into one 96-well PCR plate.

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4x 96 to 384	Sample Transfers from four 96-well plates to one 384-well plate.
96 to 4x24	Sample Transfer from one 96-well plate to four thermoracks. Execution with a single-channel dispensing tool.
Admirable results	Fills two 2.2 mL deepwell plates with 1000 µL per well. Aspiration from four 100 mL reservoirs.
Dilute 1 to 10 – 1 to 1000	Perform a dilution series using the Dilute command. Diluent is transferred to a 96-well plate using the Reagent Transfer command. Using the Sample Transfer command, samples are then transferred from a 24-tube rack into the still empty columns of the plate in front of the diluent which has already been dispensed. The transferred undiluted sample is then diluted with the diluent in three stages (Dilute command).
Disperse from 1 to 2	Use Sample Transfer to transfer from one 96-well plate to two 96-well PCR plates. An eight-channel dispensing tool is used. Each sample is dispensed into two different plates using the same tip. Tips are changed before a new sample is aspirated.
Fill 24	Simple, rapid method for filling a 24-well thermorack with 1000 µL of liquid per Safe-Lock tube. Aspiration from a 30 mL reservoir.
Fill 384	Rapid, simple filling of a 384-well twin.tec PCR plate with 20 µL water per well using dispensing tool TM 50-8. Dispensing takes the form of multidispensing. Aspiration from 30 mL reservoir. Method is recommended for checking the precision of dispensing. It is highly recommended that you also perform and assess dispensing with the "pipette" dispensing variant.
Fill 96	Rapid, simple filling of a 96-well twin.tec PCR plate with 100 µL water per well using dispensing tool TM 300-8. Dispensing takes the form of multidispensing. Aspiration from 30 mL reservoir. Method is recommended for checking the precision of dispensing. It is highly recommended that you also perform and assess dispensing with the "pipette" dispensing variant.
LI384_1	Method uses a single-channel dispensing tool to fill a 384-well plate with different solutions in a chess-board pattern. The method and in particular the pattern shown can thus be used as a basis for your own contamination tests. Modification with regard to 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 chess-board pattern results from the eight-channel dispensing tool only being able to fill every other well of a 384-well plate. The method and in particular the pattern shown can thus also be used as a basis for your own contamination tests. Modification with regard to volume, plate, liquid type etc. is recommended for the actual task.
Module rack B	Fills two 24-well plates with 1,800 µL of liquid A and 2,000 µL of liquid B from a reservoir rack supplied with module racks with 50 mL and 15 mL tubes.
Pattern1	Fills every other column of a 96-well plate using dispensing tool TM 300-8. Columns are filled with the aid of a Reagent Transfer command. Reagent aspirated from a 30 mL reservoir.
Pool	The Pool command is used to pool 4 adjacent wells of a column of a 96-well plate ("aspirate") and transfer them to a Safe-Lock tube in a thermorack.
PoolOneDestination	Pools the contents of a 96-well plate in a 300 mL reservoir.

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12.4.4 Sequencing setup

ABI 384	For preparation of the Mastermix, see Properties of the method. The method can be performed on any epMotion. The method dispenses Mastermix and templates into a 384-well twin.tec PCR plate.
ABI 96	For preparation of the Mastermix, see Properties of the method. The method can be performed on any epMotion. The method dispenses Mastermix and templates into a 96-well twin.tec PCR plate.
Amersham 384	The method dispenses Mastermix and template to a maximum of 384 positions of a twin.tec PCR plate.
Amersham 96	The method dispenses Mastermix and template to a maximum of 96 positions of a twin.tec PCR plate.

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EG-Konformitätserklärung
EC Conformity Declaration

Das bezeichnete Produkt entspricht den einschlägigen grundlegenden Anforderungen der aufgeführten EG-Richtlinien und Normen. Bei einer nicht mit uns abgestimmten Änderung des Produktes oder einer nicht bestimmungsgemäßen Anwendung verliert diese Erklärung ihre Gültigkeit.

The product named below fulfills the relevant fundamental requirements of the EC directives and standards listed. In the case of unauthorized modifications to the product or an unintended use this declaration becomes invalid.

Produktbezeichnung, Product name:

epMotion® 5070

einschließlich Zubehör / including accessories

Produkttyp, Product type:

Automatisches Pipettiersystem / automated pipetting system

Einschlägige EG-Richtlinien/Normen, Relevant EC directives/standards:

2006/95/EG, EN 61010-1, EN 61010-2-81

2004/108/EG, EN 55011/B, EN 61000-6-1, EN 61000-3-2/3, EN 61000-4-14, EN 61326-2-6

EN ISO 8655-1/-2/-6 98/79/EG, EN 591, EN 14971, EN 61010-2-101, EN 980

Vorstand, Board of Management:

28.05.2008

Hamburg, Date:

Projektmanagement, Project Management:

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