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LightCycler® and MagNA Pure® are registered trademarks of Roche Diagnostics.

epMotion optical sensor U.S. Pat. No. 6,819,437

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The software of the device (firmware) contains open source software. License information is available on request from Eppendorf AG.
# Table of contents

1 Operating instructions .......................................................... 7  
  1.1 Using this manual ................................................................. 7  
  1.2 Danger symbols and danger levels ........................................ 7  
    1.2.1 Danger symbols .......................................................... 7  
    1.2.2 Danger levels ............................................................. 7  
  1.3 Symbols used ...................................................................... 8  
  1.4 Abbreviations used ............................................................... 8  
  1.5 Glossary ........................................................................... 9  
  1.6 Revision history ................................................................. 12  

2 Product description ................................................................. 13  
  2.1 Main illustration ................................................................. 13  
    2.1.1 epMotion 5070 ............................................................. 13  
    2.1.2 epMotion 5070f ............................................................ 14  
    2.1.3 Interfaces ................................................................. 15  
    2.1.4 EasyCon ................................................................. 16  
  2.2 Delivery package ............................................................... 17  
  2.3 Features ........................................................................ 18  
    2.3.1 Function ................................................................. 18  
    2.3.2 Cleanbench .............................................................. 18  

3 Safety .................................................................................. 19  
  3.1 Intended use ................................................................. 19  
    3.1.1 Intended use of the epMotion 5070 .............................. 19  
    3.1.2 Intended use of the epMotion 5070f ......................... 19  
  3.2 User profile ................................................................. 19  
  3.3 Information on product liability ......................................... 20  
  3.4 Warnings for intended use ............................................... 20  
  3.5 Hazard symbols and safety devices on the device .............. 22  

4 Installation ........................................................................... 23  
  4.1 Selecting the location ....................................................... 23  
  4.2 Installing the device ......................................................... 23  

5 Hardware ........................................................................... 25  
  5.1 Worktable for epMotion 5070 and 5070f .............................. 25  
  5.2 Optical sensor ............................................................... 26  
  5.3 Tools ........................................................................ 27  
    5.3.1 Dispensing Tools ...................................................... 27
# dispersion liquids

## Basic procedure for dispensing

### Operating principle of dispensing tools

### Liquid aspiration up to the remaining volume

### Bottom tolerance

### Transporting and dispensing liquid

## Dispensing modes

### Dispensing mode: Pipette

### Dispensing mode: Multidispense

### Mixing

## Special features

### Liquid aspiration from bottom of vessel

### Liquid aspiration from high vessels

### Liquid dispensing at the height of the vessel edge

# Labware – vessels, plates and pipette tips

## Tubes

## Plates

### Deepwell plates

### Microplates

### PCR plates

### Tube plates

## Reservoirs

## epT.I.P.S. Motion

### epT.I.P.S. Motion Racks

### epT.I.P.S. Motion Reloads

### Tip holder for epT.I.P.S. Motion Reloads

### epT.I.P.S. Motion SafeRacks

# Labware accessories

## Racks

### Racks for 24 vessels

### Rack for 96 vessels

### Rack LC

### Thermorack and Rack 0.5/1.5/2.0 mL

### Reservoir Rack

### Reservoir Rack modules

## Adapters

### Height adapter

### Thermoadapter

### Thermoadapter LC samples

### Thermoadapter Frosty

## Thermoblocks and Thermoadapters for PCR plates

### Equipping the thermoblock with 0.2 mL vessels

## Waste container

### Waste container

### LiquidWasteTub with lid
Table of contents

epMotion® 5070
English (EN)

9 Operation .............................................................................. 61
  9.1 First steps ......................................................................... 61
    9.1.1 Switching on the epMotion .............................................. 61
    9.1.2 Using the EasyCon .......................................................... 61
    9.1.3 Using the epMotion .......................................................... 62
  9.2 Loading the worktable ......................................................... 63
    9.2.1 Display the loading .......................................................... 63
    9.2.2 Positioning tools on the worktable .................................... 64
    9.2.3 Positioning the epT.I.P.S. Motion on the worktable .......... 64
    9.2.4 Positioning the waste container on the worktable ............ 65
    9.2.5 Positioning labware on the worktable ............................. 65
  9.3 Executing an application ..................................................... 66
    9.3.1 Performing a test run ...................................................... 66
    9.3.2 Starting the application ................................................... 67
    9.3.3 Controlling the application run ........................................ 67
  9.4 Completing your work ....................................................... 69
    9.4.1 Cleaning up the worktable .............................................. 69
    9.4.2 Switching off the epMotion ............................................. 70

10 Maintenance ......................................................................... 71
  10.1 Decontamination and cleaning ........................................... 71
    10.1.1 Carrying out wipe decontamination ............................... 72
    10.1.2 Carrying out spray decontamination ............................. 73
    10.1.3 Autoclaving .................................................................. 74
  10.2 Decontamination before shipment ....................................... 74
  10.3 Servicing the device .......................................................... 74
  10.4 Fuses ................................................................................ 75
  10.5 Carrying out firmware updates ............................................ 75
  10.6 Checking the dispensing volume .......................................... 75
  10.7 Maintaining the dispensing tools ......................................... 76
    10.7.1 Exchanging the sealing rings on the eight-channel dispensing tool ........................................ 76
  10.8 Customer service functions ................................................. 77

11 Troubleshooting ..................................................................... 79
  11.1 Error search ..................................................................... 79
  11.2 General errors ................................................................... 80
    11.2.1 Optical sensor errors .................................................... 80
    11.2.2 Dispensing errors ........................................................ 81
    11.2.3 Software errors ........................................................... 81

12 Transport, storage and disposal ............................................ 83
  12.1 Transport ......................................................................... 83
  12.2 Storage .............................................................................. 83
  12.3 Disposal ............................................................................ 84
# Table of contents

epMotion® 5070  
English (EN)

## 13 Technical data
- 13.1 Power supply: 85
- 13.2 Ambient conditions: 85
- 13.3 Weight/dimensions: 85
- 13.4 Noise level: 85
- 13.5 Interfaces: 85
- 13.6 EasyCon: 86
- 13.7 Additional specifications:
  - 13.7.1 Optical sensor: 86
  - 13.7.2 Carrier: 86
- 13.8 Dispensing tool errors:
  - 13.8.1 Pipetting: 87
  - 13.8.2 Dispensing: 88
- 13.9 Test conditions for dispensing tool errors: 88

## 14 Ordering Information
- 14.1 Tools: 89
- 14.2 epT.I.P.S. Motion: 89
- 14.3 Plates: 91
- 14.4 Reservoirs: 91
- 14.5 Racks: 92
- 14.6 Adapters: 93
- 14.7 Thermoblocks: 93
- 14.8 Accessories: 94

Index: 95
1 Operating instructions

1.1 Using this manual

Your epMotion operating manual consists of hardware instructions and software instructions. Short instructions are available for optional software enhancements.

The operating manual is part of the product.

The current version of the operating manual can be found on our webpage: www.eppendorf.com.

- Read the operating manual in full before using the device.
- Store the operating manual at an easily accessible location.
- The device may only be transferred with the operating manual.
- If the operating manual is lost, replace it immediately. Please contact Eppendorf AG for further details.

1.2 Danger symbols and danger levels

The safety instructions in this manual appear with the following danger symbols and danger levels:

1.2.1 Danger symbols

<table>
<thead>
<tr>
<th>Biohazard</th>
<th>Explosion</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Biohazard" /></td>
<td><img src="image" alt="Explosion" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electric shock</th>
<th>Heavy loads</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Electric shock" /></td>
<td><img src="image" alt="Heavy loads" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cuts</th>
<th>Hot surface</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Cuts" /></td>
<td><img src="image" alt="Hot surface" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hazard point</th>
<th>Material damage</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Hazard point" /></td>
<td><img src="image" alt="Material damage" /></td>
</tr>
</tbody>
</table>

1.2.2 Danger levels

<table>
<thead>
<tr>
<th>DANGER</th>
<th>Will lead to severe injuries or death.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WARNING</td>
<td>May lead to severe injuries or death.</td>
</tr>
<tr>
<td>CAUTION</td>
<td>May lead to light to moderate injuries.</td>
</tr>
<tr>
<td>NOTICE</td>
<td>May lead to material damage.</td>
</tr>
</tbody>
</table>
1.3 Symbols used

<table>
<thead>
<tr>
<th>Depiction</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Actions in the specified order</td>
</tr>
<tr>
<td>2.</td>
<td>Actions without a specified order</td>
</tr>
<tr>
<td>▶</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>List:</td>
</tr>
<tr>
<td>Text</td>
<td>Display or software texts</td>
</tr>
<tr>
<td>📚</td>
<td>Additional information</td>
</tr>
</tbody>
</table>

1.4 Abbreviations used

**DNA**
Deoxyribonucleic acid (DNA)

**DWP**
Deepwell plate

**epT.I.P.S.**
**eppendorf** Totally Integrated Pipetting System

**LH**
Liquid handling

**MTP**
Micro test plate

**PCR**
Polymerase chain reaction

**PDF**
Portable Document Format

**USB**
Universal Serial Bus
1.5 Glossary

A

**Application**
Programs for a specific application. An application includes the procedure and the equipping of the worktable.

C

**Cleanbench**
Class 2 safety cabinet for personal security and product protection. A laminar air flow prevents germs from entering the cabinet from the ambience. The air flow also prevents aerosols that contain microorganisms from escaping the cabinet.

D

**Destination labware**
Labware that liquid is dispensed into during the application. Destination labware refers to a plate or rack.

**Destination position**
Position that liquid is dispensed into during the application.

**Destination vessel**
The vessel into which liquid is dispensed during the application.

**Dispensing tool**
Tool that aspirates and dispenses liquid. Single-channel dispensing tools and eight-channel dispensing tools are available for various volume ranges.

E

**EasyCon**
epMotion control panel. You can control your epMotion using the control panel and epBlue software.

**epBlue**
Software for creating and administering applications and labware. The epMotion is controlled using the software.

**Eppendorf Quality**
Eppendorf Quality is an Eppendorf AG purity grade for consumables. Eppendorf Quality meets the requirements for standard products, e.g., precision, accuracy, wetting behavior and tightness.

**epT.I.P.S.® Motion**
epMotion pipette tips. Only epT.I.P.S.® Motion can be used on the epMotion for all features. epT.I.P.S.® Motions are available with or without a filter.
F

Filling volume
Maximum liquid volume of a labware. The epMotion uses the gripper to transport the labware up to the filling volume. The epMotion aspirates liquid from the labware up to the filling volume. The filling volume is higher than the working volume.

H

Height adapter
Adapter for low labware. The height differences among the labware will be offset to decrease the tool holder paths, thereby decreasing the run time of the application as well.

I

Intermediate labware
Labware that is used to dispense and aspirate liquids during the application.

Intermediate position
Position that is used to dispense and aspirate liquids during the application.

Intermediate vessel
Vessel that is used to dispense and aspirate liquids during the application.

L

Labware
Racks, plates, tips, etc. which are placed on the worktable.

Location
Area on the worktable where the labware is placed.

P

PCR clean
PCR clean is an Eppendorf AG purity grade for consumables. PCR clean meets the requirements for standard products, e.g., precision, accuracy, wetting behavior, tightness. PCR clean also meets the requirements with regard to absence of human DNA, DNase, RNase and PCR inhibitors. Consumables with the PCR clean purity grade are controlled and certified by an external laboratory. Certificates are available for downloading from our webpage www.eppendorf.com.

Procedure
Sequence of commands that are executed one after the other. Part of an application.

R

Rack
Mount for tubes or pipette tips.
Random error
Precision. Standard deviation of the average value of the dispensed volumes.

Remaining volume
Volume that cannot be aspirated from a vessel. The distance from the pipette tip to the vessel bottom, defined in the software, and the defined immersion depth of the pipette tip in the liquid, must be observed. Therefore, the pipette tip cannot aspirate the volume. The remaining volume depends on the vessel geometry.

Reservoir
Reservoirs are used to hold reagents. Reservoirs are hung in a Reservoir Rack or placed directly on the worktable.

S

SafeRack
Rack with ep.T.I.P.S. Motion pipette tips. The SafeRack features a partition that prevents the contamination of adjacent tips. Use the SafeRacks if you would like to use tips several times.

Source labware
Labware that liquid is aspirated from during the application. Source labware refers to a plate or rack.

Source position
Position that liquid is aspirated from during the application.

Source vessel
The vessel from which liquid is aspirated during the application.

Sterile
Sterile is an Eppendorf AG purity grade for consumables. Sterile meets the requirements for standard products, e.g., precision, accuracy, wetting behavior, tightness. Sterile also meets the requirements with regard to sterility and freedom from pyrogens.

Systematic error
Accuracy. Deviation of the average value of the dispensed volumes from the selected volume.

T

Thermoadapter
Heat-conductive adapter for holding plates.

Thermoblock
A thermoadapter that is permanently connected to a PCR plate or PCR tube.

Thermorack
Temperable rack for smaller vessels, e.g., Safe-Lock tubes for 0.5 mL, 1.5 mL or 2 mL.
**V**

**Vessel**
Tube or single well of a plate.

**W**

**Work volume**
Liquid volume of a labware. The epMotion fills a vessel with low levels of contamination up to the working volume. The working volume is less than the filling volume.

**Worktable**
Work surface of the epMotion where labware and tools are placed. In the software, the epMotion worktable is shown as the epBlue worktable.

### 1.6 Revision history

Revision history for the hardware operating manuals for the epMotion 5070, order number 5070 900.850.

<table>
<thead>
<tr>
<th>Version of the operating manual</th>
<th>Date</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version 00</td>
<td>June 2013</td>
<td>Created new</td>
</tr>
</tbody>
</table>
2 Product description

2.1 Main illustration

2.1.1 epMotion 5070

Fig. 2-1: Main illustration epMotion 5070

1 Carrier
The carrier moves in X-direction, Y-direction and Z-direction.

2 Tool holder
Holds dispensing tools.

3 Optical sensor
Detects levels, tips and labware.

4 Mains power connection

5 Interfaces

6 Worktable
Work surface for tools and labware.

7 EasyCon
Control panel used to control the epMotion.

8 Front hood
Safety device for protection from movable parts and contamination.

9 Mains power switch
2.1.2 epMotion 5070f

Fig. 2-2: Main illustration epMotion 5070f

1 Carrier
   The carrier moves in X-direction, Y-direction and Z-direction.

2 Tool holder
   Holds dispensing tools.

3 Optical sensor
   Detects levels, tips and labware.

4 Mains power connection

5 Interfaces

6 Worktable
   Work surface for tools and labware.

7 EasyCon
   Control panel used to control the epMotion.

8 Mains power switch

9 Light barrier
   The light reflectors are located on the inside of the front screen of the Cleanbench.
2.1.3 Interfaces

Fig. 2-3: Interfaces epMotion 5070 and 5070f

*Ethernet*  
Connection for the cable to the EasyCon

*USB*  
Connection for a USB storage medium for firmware updates.

Only devices which meet the requirements of IEC 950/EN 60950-1 (UL 1950) standards may be connected to the interfaces.
2.1.4 EasyCon

Fig. 2-4: EasyCon

The EasyCon is the control panel of the epMotion. The EasyCon has a touch-sensitive color display (touchscreen). A key pad will be shown on the display for data entry.

Fig. 2-5: InterfacesEasyCon

1 **USB**
Connections for mouse with a USB connection cable or USB storage medium

2 **Ethernet**
Connection for the epMotion cable

Only devices which meet the requirements of IEC 950/EN 60950-1 (UL 1950) standards may be connected to the interfaces.
2.2 Delivery package

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Order no. (International)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5070 000.263</td>
<td>Automated pipetting system epMotion 5070f main device, with EasyCon, accessories, installed software epBlue 100 V - 240 V, 50 / 60 Hz</td>
</tr>
<tr>
<td>or 1</td>
<td>5070 000.264</td>
<td>Automated pipetting system epMotion 5070f main device for cleanbench, with EasyCon, accessories, installed software epBlue 100 V - 240 V, 50 / 60 Hz</td>
</tr>
<tr>
<td>1</td>
<td>5073 005.002</td>
<td>EasyCon Control panel</td>
</tr>
<tr>
<td>1</td>
<td>-</td>
<td>Mouse With USB connection cable</td>
</tr>
<tr>
<td>1</td>
<td>-</td>
<td>Cable For connecting the EasyCon to the epMotion</td>
</tr>
<tr>
<td>1</td>
<td>-</td>
<td>Mains power cable Compatible with the country where the order was placed or defined</td>
</tr>
<tr>
<td>1</td>
<td>-</td>
<td>USB cable For connecting USB devices to the EasyCon</td>
</tr>
<tr>
<td>1</td>
<td>5075 753.006</td>
<td>Tool for transport securing device</td>
</tr>
<tr>
<td>1</td>
<td>5070 900.850</td>
<td>Operating Manual epMotion 5070</td>
</tr>
<tr>
<td>1</td>
<td>5075 901.250</td>
<td>Operating Manual software operating manual epBlue with EasyCon</td>
</tr>
</tbody>
</table>
2.3 Features

The epMotion 5070 is available with different features. All available features are described in this manual.

2.3.1 Function

The epMotion 5070 is an automatic system for dispensing liquids using dispensing tools and ep.T.I.P.S. Motion pipette tips.

The epMotion 5070 dispenses liquids in the volume range 1 µL – 1 000 µL.

The dispensing tool aspirates liquid from source vessels and dispenses this liquid in destination vessels. The dispensing tool works according to the piston-stroke principle. For the epMotion, dispensing tools are available for 3 different volume ranges.

The epMotion features an optical sensor. The sensor checks:
- Type and location of labware
- Quantity and position of pipette tips in the rack
- Filling level of vessels

You control the epMotion 5070 via the EasyCon control unit with the epBlue software.

You can use the epBlue software to define dispensing processes and compile them into an application. To do so, you select source vessels and destination vessels, define the procedure and define the transfer pattern.

2.3.2 Cleanbench

The epMotion 5070f must only be operated in a Cleanbench. The function corresponds to a epMotion 5070 without a Cleanbench.

Additional information on your epMotion is available at: www.eppendorf.com/automation.
3 Safety

3.1 Intended use

3.1.1 Intended use of the epMotion 5070

The device is intended for use in laboratories for research, development, and industrial and routine work, as well as for training purposes. The areas of applications include – but are not limited to – the fields of life sciences, biotechnology, chemistry and clinical research.

The automated pipetting system epMotion 5070 is designed for the monitoring of contamination-free, precise and correct dispensing and transferring of liquids and to automatically check the combining of liquids.

The autoclavable dispensing tools work in a volume range from 1 μL to 1000 μL.

The device meets the basic, essential requirements of the EC Directives and Standards that are listed in the declaration of conformity, but the product is not registered with the FDA.

These automated pipetting systems are exclusively intended for use indoors and may only be used by skilled personnel who have received adequate training.

3.1.2 Intended use of the epMotion 5070f

The device is intended for use in laboratories for research, development, and industrial and routine work, as well as for training purposes. The areas of applications include – but are not limited to – the fields of life sciences, biotechnology, chemistry and clinical research.

The automated pipetting system epMotion 5070f is designed for the monitoring of contamination-free, precise and correct dispensing and transferring of liquids and to check the combining of liquids automatically.

The autoclavable dispensing tools work in a volume range from 1 μL to 1000 μL.

The epMotion 5070f must only be operated in a Cleanbench.

The device meets the basic, essential requirements of the EC Directives and Standards that are listed in the declaration of conformity, but the product is not registered with the FDA.

These automated pipetting systems are exclusively intended for use indoors and may only be used by skilled personnel who have received adequate training.

3.2 User profile

This device may only be operated by skilled personnel.

The skilled personnel must have received training on this device. The training must have been conducted by Eppendorf AG or an authorized partner of Eppendorf AG.

The skilled personnel must have read the operating manual carefully. The skilled personnel must have read the operating manuals of all software components carefully.
3.3 Information on product liability

In the following cases, the designated protection of the device may be compromised. Liability for any resulting property damage or personal injury is then transferred to the operator:

• The device is not used in accordance with the operating manual.
• The device is used outside of its intended use.
• The device is used with accessories or consumables which are not recommended by Eppendorf.
• The device is maintained or repaired by people not authorized by Eppendorf.
• The user makes unauthorized changes to the device.

3.4 Warnings for intended use

---

**DANGER! Risk of explosion.**

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

---

**WARNING! Lethal voltages inside the device.**

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

---

**WARNING! Electric shock due to damage to device or mains cable.**

- Only switch on the device if the device and mains cable are undamaged.
- Only use devices that have been properly installed or repaired.
- In case of danger, disconnect the device from the mains supply by pulling the power plug from the device or the mains socket or, by using the isolating device intended for this purpose (e.g. emergency stop switch in the laboratory).

---

**WARNING! Risk from incorrect supply voltage**

- Only connect the device to voltage sources which correspond to the electrical requirements on the name plate.
- Only use sockets with a protective earth (PE) conductor and suitable power cable.
WARNING! Damage to health due to infectious liquids and pathogenic germs.

- When handling infectious liquids and pathogenic germs, observe the national regulations, the biological security level of your laboratory, the material safety data sheets, and the manufacturer’s application notes.
- Wear personal protective equipment.
- For full instructions regarding the handling of germs or biological material of risk group II or higher, please refer to the “Laboratory Biosafety Manual” (Source: World Health Organization, current edition of the Laboratory Biosafety Manual).

WARNING! Health hazard from skin contact with infectious substances.

- Wear protective gloves.

WARNING! Danger due to flammable and infectious liquids in the waste container.

Pipette tips in the waste container may contain flammable or infectious liquids.

- Wear personal protective equipment.
- Handle the pipette tips and sample materials from the waste container in accordance with the material safety data sheets, safety regulations and laboratory guidelines.

WARNING! Damage to health due to contaminated device and accessories.

- Decontaminate the device and the accessories before storage and shipping.

CAUTION! Risk of injury due to carrier movement.

The carrier may still be moving when the front hood of the epMotion is opened.

- Wait until the carrier stops moving before reaching into the device.

CAUTION! Cuts due to broken glass.

A damaged touchscreen leads to cuts on the hands.

- Only use the EasyCon if it is not damaged.

CAUTION! Poor safety due to incorrect accessories and spare parts.

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

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

NOTICE! Spilled liquid can cause damage to the device.

- Switch off the device.
- Disconnect the power plug.
- Collect the spilled liquid. Observe the specifications for the liquid in the material safety data sheets.

NOTICE! Size of disposables can change through autoclaving.

- Do not use autoclaved disposable products in automated applications.
3.5 Hazard symbols and safety devices on the device

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

---

**Fig. 3-1: Hazard symbols and safety devices on the epMotion 5070**

**Tab. 3-1: Hazard symbols**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>![Warning Symbol]</td>
</tr>
</tbody>
</table>
|   | **WARNING**  
|   | Observe the operating manual.  |

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>![Warning Symbol]</td>
</tr>
</tbody>
</table>
|   | **WARNING**  
|   | The carrier may continue moving after the front panel has been opened.  
|   | ▶ Wait until the carrier stops moving before reaching into the device.  |

**Tab. 3-2: Safety devices**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The housing or the cleanbench protects the user from contamination and moving parts.</td>
</tr>
</tbody>
</table>
4 Installation

4.1 Selecting the location

Information on ambient conditions, dimensions and weights can be found in the technical data (see Weight/dimensions on p. 85).

Select the location for the device according to the following criteria:

Electrical connections
• Mains connection in accordance with the name plate.
• The device mains/power switch and cutting unit of the power system circuit (e.g., FI protective switch) can be accessed during operation.

Location
• The ambient conditions match the specifications in the technical data.
• The location is well ventilated.
• The location is protected from direct sunlight.
• The location is not next to heat sources, such as heaters or drier compartments.
• There is an adequate amount of space available for the device. The minimum distances to other devices and walls is 6 cm.
• The device can be safely and easily operated at this location.

Workplace
• The lab bench is permanently mounted.
• The lab bench is designed for the weight of the device.
• The lab bench has a horizontal, plane work surface.
• The lab bench has a non-slip surface.
• The lab bench is vibration-free.
• There are no vibrating devices on the lab bench.

Cleanbench
• The Cleanbench is 60 cm deep.
• The Cleanbench cables are routed along its side.
• The laminar airflow in the Cleanbench is not affected by the device.
• There are light reflectors on the front screen of the Cleanbench.

4.2 Installing the device

The epMotion may only be installed and commissioned by skilled personnel authorized by Eppendorf.

Information on transport (see Transport on p. 83).
5 Hardware
5.1 Worktable for epMotion 5070 and 5070f

Fig. 5-1: Worktable for epMotion

A1-B2
Locations for labware

T1-T2
Locations for dispensing tools

Waste
Location for waste container
5.2 Optical sensor

On the carrier, the optical sensor is located to the right of the tool holder.

The optical sensor records the intensity of the reflected light using a lateral infrared light source, semi-transparent mirror, fixed lens and the procedure in z-direction. Height $z_0$ is defined as the point with the highest intensity which enables the detection of the level in a vessel or the presence of labware.

The optical sensor can detect horizontal, plane surfaces. The surface of the liquid must be at an angle of $90^\circ \pm 3^\circ$ to the optical axis.

The surfaces of liquids can be strongly bent by the vessel geometry or the physical properties of the liquid or vessel. The optical sensor may not detect the level on strongly bent surfaces. If this is the case, the user must enter the liquid volume.

The optical sensor has a detection limit for vessel levels. The detection limit depends on the vessel geometry. Generally, levels of 3 mm or higher can be detected.

The following functions of the optical sensor can be activated:

- **Liquid detection**
  Determines the filling level for positions of labware, which has the Liquid detection option activated.
- **Tip detection**
  Checks to see if the pipette tips defined in the application are available.
  Determines the quantity and position of tips in the rack.
  Works only with epT.I.P.S. Motion in TipHolders and Racks from Eppendorf.
- **Location detection**
  Detects the labware coding.
  Checks to see if the labware on the epMotion worktable matches the labware on the epBlue worktable.

Information on setting the optical sensor, and a detailed description of all functions, can be found in the software operating manual.
5.3 Tools

NOTICE! Damage to the gold contacts from handling.
The tool is damaged if the gold contacts on the tool become damaged or contaminated.
- Do not touch the gold contacts.

The tool holder picks up a dispensing tool and puts it down again. The tool holder recognizes the tool from its gold contacts.

5.3.1 Dispensing Tools

Fig. 5-3: Single-channel dispensing tool and eight-channel dispensing tool

The dispensing tools are piston-stroke pipettes. The function of the dispensing tools is described in the chapter (see Dispensing liquids on p. 29).

Single-channel dispensing tools and eight-channel dispensing tools, with 3 volume ranges each, are available for the epMotion.

Tab. 5-1: Volume range of the dispensing tools

<table>
<thead>
<tr>
<th>Single-channel dispensing tool</th>
<th>Multi-channel dispensing tool</th>
<th>Volume range</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS 50</td>
<td>TM 50</td>
<td>1 µL – 50 µL</td>
</tr>
<tr>
<td>TS 300</td>
<td>TM 300</td>
<td>20 µL – 300 µL</td>
</tr>
<tr>
<td>TS 10000</td>
<td>TM 1000</td>
<td>40 µL – 1000 µL</td>
</tr>
</tbody>
</table>

The dispensing tool errors can be found in the technical data (see p. 87).

Help on dispensing errors can be found in the "Maintenance" chapter (see Dispensing errors on p. 81).
6 Dispensing liquids

6.1 Basic procedure for dispensing

6.1.1 Operating principle of dispensing tools

The dispensing tools are piston-stroke pipettes that function according to the air cushion principle.

If the piston moves upward in the dispensing tool, liquid will be aspirated into the pipette tip. If the piston moves downward in the dispensing tool, liquid will be dispensed from the pipette tip. The pistons will be moved by a motor in the tool holder.

On eight-channel dispensing tools, all 8 channels move simultaneously.
6.1.2  Liquid aspiration up to the remaining volume

Fig. 6-2:  Liquid aspiration up to the remaining volume with a constant immersion depth

The pipette tip is immersed 3 mm into the liquid before liquid aspiration. The pipette tip moves downward during liquid aspiration. The immersion depth of 3 mm remains constant while the liquid level decreases.

If the pipette tip reaches a distance of 1 mm to the base of the vessel, the pipette tip reduces its immersion depth to 0.7 mm. If the liquid level continues to sink, the pipette tip will not aspirate any additional liquid. The remaining volume remains in the vessel.

A remaining volume is present because the pipette tip has a minimum immersion depth in the liquid and a minimum distance to the base of the vessel. Under normal conditions, the remaining volume is calculated using a filling level of 1.7 mm.

The distance of the pipette tip to the base of the vessel can be changed in the software (refer to epMotion software operating manual).

If the liquid is aspirated from the remaining volume, the bend of the liquid level can lead to dispensing errors.

6.1.3  Bottom tolerance

The bottom tolerance is the distance between the vessel base and the lower end of the pipette tip. The default setting for the bottom tolerance is 1 mm. For 30 mL and 100 mL reservoirs, the default setting for the bottom tolerance is 2.5 mm.

Decreasing the bottom tolerance also reduces the remaining volume.

1.  Removing liquid above a pellet increases the bottom tolerance.
2.  Do not decrease the bottom tolerance on uneven plates.
3.  Check the set bottom tolerance when exchanging pipette tips, plates or vessels.
6.1.4 Transporting and dispensing liquid

The liquid from the pipette tip will be dispensed in the free jet. The liquid will be dispensed into the vessel 3 mm – 4 mm above the surface of the liquid. The pipette tip moves upward during dispensing. The distance from the pipette tip to the surface of the liquid remains constant.

For liquid type ProteinC, a distance of 5 mm from the pipette tip to the surface of the liquid is set in the software. This setting takes into account the tendency of concentrated protein solutions to form foam.

6.1.4.2 Transporting liquids

The liquid is drawn into the pipette tip before transport. An area filled with air is created in the lower part of the pipette tip. The liquid does not drip during transport.
6.2 Dispensing modes

The epMotion can be used to dispense liquids in the Pipette and Multidispense modes.

6.2.1 Dispensing mode: Pipette

In the Pipette mode, a defined volume of liquid is aspirated and fully dispensed.

Dispensing errors are smaller than in the Multidispense (see Dispensing tool errors on p. 87) mode.

The epMotion executes a blow-out in the Pipette mode. Residual liquid from the pipette tip will be dispensed in the destination vessel. The blow-out is part of the dispensing volume. The blow-out can be set in the software (refer to epMotion software operating manual).

In the Pipette mode, the smallest dispensing volume for water is 1 μL.

6.2.2 Dispensing mode: Multidispense

In the Multidispense mode, liquid is aspirated and dispensed in the destination vessels in defined partial quantities.

Dispensing errors are larger than in the Pipette (see Dispensing tool errors on p. 87) mode.

The epMotion carries out a remaining stroke in the Multidispense mode. Residual liquid from the pipette tip will be dispensed in the waste vessel or source vessel. The residual liquid is not part of the dispensing volume.

In the Multidispense mode, the smallest dispensing volume for water is 3 μL.

6.2.2.1 Aspiration volume at Multidispense

To create the same physical conditions for all dispensing steps, more liquid must be aspirated in the Multidispense mode than the sum of the dispensing volumes. This is the result of the reverse stroke and the remaining stroke.

Reverse stroke
• The reverse stroke occurs after liquid aspiration.
  Part of the aspirated volume is immediately returned to the source vessel.
  The reverse stroke is the same size for all liquids.

Remaining stroke
• After the reverse stroke, there is more liquid in the pipette tip than the amount required for the dispensing steps. This additional aspiration volume will be dispensed as a remaining stroke after dispensing.
  The additional aspiration volume will be dispensed to the source vessel if the tips are not replaced before each liquid aspiration.
  The additional aspiration volume will be dispensed to the waste container if the tips are not replaced before each liquid aspiration.
The volume for the additional aspiration depends on the dispensing tool; the software will take it into account when calculating the required aspiration volume.

### Dispensing tool

<table>
<thead>
<tr>
<th>Dispensing tool</th>
<th>Additional volume per channel for reverse stroke</th>
<th>Additional volume per channel for remaining stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-channel dispensing tool TS 50</td>
<td>5.8 µL</td>
<td>2.5 µL</td>
</tr>
<tr>
<td>Eight-channel dispensing tool TM 50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single-channel dispensing tool TS 300</td>
<td>16.7 µL</td>
<td>3.7 µL</td>
</tr>
<tr>
<td>Eight-channel dispensing tool TM 300</td>
<td>45.2 µL</td>
<td>5.0 µL</td>
</tr>
<tr>
<td>Single-channel dispensing tool TS 1000</td>
<td>50.3 µL</td>
<td>35.2 µL</td>
</tr>
<tr>
<td>Eight-channel dispensing tool TM 1000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Example for aspiration volume for multi-dispensing

A 96-well plate should be filled with 10 µL water in each well via multi-dispensing. The eight-channel dispensing tool TM 50 is used. Aspiration is performed from one reservoir. The tips are not changed before a new liquid aspiration.

**Sum of the aspiration volumes for multi-dispensing:**

- 96 x 10 µL for 96-well plate: 960 µL
- 8 x 5.8 µL reverse stroke: 46.4 µL
- 8 x 2.5 µL additional aspiration: 20 µL
- Sum: **1026.4 µL**

### 6.2.3 Mixing

Liquids can be mixed via multiple pipetting.

A mixing cycle consists of one upward movement and one downward movement of the piston in the dispensing tool.

The aspiration level and dispensing level of the liquid can be defined during mixing. A defined height should only be used for levels below the working volume as the vessel may overflow with larger levels.

During the mixing process, the pipette tip is in the liquid. The blow-out will be executed above the surface of the liquid after the mixing procedure.

Defined mixing speeds are defined in the liquid types. When using your own settings, determine the optimal mixing speed via experiments.

---

**NOTICE! Contamination of the dispensing tool due to high mixing frequency.**

If the mixing frequency is too high, liquid may enter the dispensing tool.

- If the liquid has a low viscosity or tends to foam, set a low mixing frequency.
- Use demineralized water to test the mixing settings.
- Use pipette tips with filter.
6.2.3.1 Recommended mixing speeds

You can set mixing speeds of 0.2 mm/s – 110 mm/s.

<table>
<thead>
<tr>
<th>Dispensing tool</th>
<th>Mixing speed of lower volume range in mm/s</th>
<th>Mixing speed of medium volume range in mm/s</th>
<th>Mixing speed of upper volume range in mm/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS 50</td>
<td>15 – 88</td>
<td>15 – 44</td>
<td>10 – 40</td>
</tr>
<tr>
<td>TM 50</td>
<td>15 – 88</td>
<td>15 – 44</td>
<td>10 – 40</td>
</tr>
<tr>
<td>TS 300</td>
<td>5 – 15</td>
<td>6 – 16</td>
<td>6 – 16</td>
</tr>
<tr>
<td>TM 300</td>
<td>2 – 11</td>
<td>2 – 11</td>
<td>2 – 11</td>
</tr>
<tr>
<td>TS 1000</td>
<td>4 – 15</td>
<td>4 – 15</td>
<td>4 – 15</td>
</tr>
<tr>
<td>TM 1000</td>
<td>4 – 15</td>
<td>4 – 15</td>
<td>4 – 15</td>
</tr>
</tbody>
</table>

6.3 Special features

6.3.1 Liquid aspiration from bottom of vessel

The pipette tip can also be positioned above the bottom of the vessel at the height of the bottom tolerance. This prevents the pipette tip from changing its position during liquid aspiration.

The level in the vessels may not exceed the working volume. If the level exceeds the working volume, liquid may overflow.

Liquid aspiration from the bottom of the vessel is recommended in the following cases:

- For vessels ≤0.5 mL, 96-well plates and 384-well plates
- For plates with various filling volumes in the wells
- For vessels with low filling volumes

Liquid aspiration from the bottom of the vessel can be activated in the software using the *Aspirate from bottom* option (refer to epMotion software operating manual). The bottom tolerance, which can be set in the software, depends on the labware.

![Diagram of liquid displacement in vessels](image)

Fig. 6-4: Liquid displacement in vessels

A  Vessel filled up to the working volume  
B  Vessel with maximum immersed tip before liquid aspiration
6.3.2 Liquid aspiration from high vessels

Observe the following special features when using high vessels, e.g., 15 mL centrifuge tubes.

6.3.2.1 Liquid aspiration from bottom of vessel

If you use vessels > 3 mL with high levels, do not aspirate liquids from the bottom of the vessel. This will result in the outside of the pipette tip being wetted, which increases the risk of contamination and distorts the dispensing result. For very large vessels with high levels, the entire pipette tip and the tip cone of the dispensing tool will be wetted.

6.3.2.2 High remaining volume

50 µL tips and 300 µL tips do not extend as far into the vessels as 1000 µL tips. In high vessels, 50 µL and 300 µL tips do not reach the bottom of the vessels. If you use 50 µL and 300 µL tips, the remaining volume will be larger than with 1000 µL tips.

Work with the 1000 µL dispensing tool when you use high vessels. If you use the 50 µL dispensing tool or the 300 µL dispensing tool, and would like to reduce the remaining volume, select the lower vessels.
6.3.3 Liquid dispensing at the height of the vessel edge

In the software, the pipette tip can be positioned at a height of 3 mm – 4 mm below the edge of the vessel using the Dispense from top option. The height of the pipette tip does not change.

Use the option for:

- Quick dispensing
- Dispensing in vessels with small diameters, e.g., 384-well plates, capillaries
  The tips remains in the upper area of the vessel and do not travel further into the vessel. This virtually eliminates the possibility of the pipette tip becoming contaminated.
- Dispensing in plates with vastly different levels in the wells
7  Labware – vessels, plates and pipette tips

The term *labware* refers to epMotion consumables and accessories. Consumables are vessels, plates and pipette tips. Accessories are adapters, blocks and racks. epBlue includes a definition for labware that is placed on the epMotion worktable. The definition includes data on the geometry, tempering ability, volume and bottom tolerance of the labware.

- The epMotion can be used with a variety of labware from various manufacturers. Information on how to expand the labware library can be found in the software operating manual.

- Labware may not exceed an overall height of 126 mm. The software generates an error message if this overall height is exceeded.

![Fig. 7-1: Reaction vessel with lid](image)

<table>
<thead>
<tr>
<th>1</th>
<th>Filling volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Working volume</td>
</tr>
<tr>
<td>3</td>
<td>Detection limit of optical sensor</td>
</tr>
<tr>
<td>4</td>
<td>Remaining volume</td>
</tr>
</tbody>
</table>

7.1  Tubes

The vessels will be inserted in racks. All reaction vessels which fit in an epMotion rack can be used.

**Examples of reaction vessels that can be used:**
- Safe-Lock tubes
- Standard reaction vessels 3810X
- PCR vessels
- Conical tubes/centrifuge tubes
- Cryotubes

Level measurement using the optical sensor is more difficult with 0.2 mL and 0.5 mL tubes.

Use Thermoracks or Reservoir Rack modules to temper vessels.
7.2 Plates

Fig. 7-2: Plates: left 96-well MTP, middle 24-well MTP, right 96-well DWP

The following plates are available for the epMotion:
• DWP plates with 24, 96 or 384 wells
• MTP plates with 6, 24, 48, 96 or 384 wells
• PCR plates with 96 or 384 wells
• Vessel plates with 96 individual vessels (tube plates)

Skirted plates can be placed directly at a worktable location. Plates can be placed on adapters.

Stacking plates

If they are manufactured by Eppendorf, the same type of plates can be stacked on the worktable. If you would like to stack plates, use Eppendorf plates. Plates from other manufacturers may have deviating dimensions, which will prevent them from being stacked.

7.2.1 Deepwell plates

Fig. 7-3: Deepwell plate with 96 wells

A maximum of 2 Eppendorf DWP plates can be stacked at one location.

A thermoadapter is available for the Eppendorf 1.0 mL deepwell plate.
7.2.2 Microplates

A maximum of 5 Eppendorf MTP plates can be stacked at one location.

A level measurement with optical sensor cannot be completed for an MTP with 384 wells. A level measurement with optical sensor is not recommended for an MTP with 96 wells.

7.2.3 PCR plates

PCR plates are available with 96 and 384 wells.

96-well PCR plates are available with a border (skirted), a semi-border (semi-skirted) or without a border (unskirted).

96-well PCR plates with a semi-border or without a border can only be positioned and transported with the Thermoblock PCR 96.

Tab. 7-1: Placing PCR plates on the worktable

<table>
<thead>
<tr>
<th>Plate</th>
<th>With thermoblock</th>
<th>With thermoadapter</th>
<th>Direct</th>
</tr>
</thead>
<tbody>
<tr>
<td>96-well PCR plates skirted</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>96-well PCR plates semi-skirted</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>96-well PCR plates unskirted</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7.2.4 Tube plates

Tube plates are plates with individual vessels. Tube plates are available in various vessel layouts. Tube plates are treated as normal plates.
7.3 Reservoirs

Reservoirs make liquid available. Reservoirs are available in 30 mL, 100 mL and 400 mL sizes. Reservoirs for 30 mL and 100 mL are placed in a Reservoir Rack.

Reservoirs are made of polypropylene (PP).

**Properties of 30 mL and 100 mL reservoirs**
- 30 mL reservoirs can be used with all tips.
- The 30 mL reservoirs are very tight at the bottom. If the bottom tolerance is reduced, reservoirs for 30 mL can also be lifted using pipette tips.
- Reservoirs for 30 mL and 100 mL have a ribbed base. If the bottom tolerance has been reduced, the information on the remaining volume is not precise.
- Reservoirs for 30 mL and 100 mL are particularly well-suited for eight-channel dispensing tools.
- The eight-channel dispensing tools TM 50 and TM 300 cannot be immersed all the way to the bottom in the 100 mL reservoir. A higher remaining volume remains in the reservoir.

**Properties of 400 mL reservoirs**
- The remaining volume of the 400 mL reservoir is approx. 10 mL.
7.4  epT.I.P.S. Motion

**NOTICE! Dispensing error due to incorrect handling of pipette tips.**
Tips become deformed and change size during autoclaving.
- Do not autoclave the pipette tips. Use tips with the sterile specification, if required.
- Do not stack any racks that contain pipette tips.

Observe the instructions for use for the epT.I.P.S. Motion Racks and epT.I.P.S. Motion Reloads.

Fig. 7-8:  epT.I.P.S. Motion 1 000 µL, 50µL, 300 µL

epT.I.P.S. Motion are special pipette tips for the epMotion.

epT.I.P.S. Motion pipette tips, racks and trays are made from polypropylene (PP). The filter is made of polyethylene (PE).

The optical sensor detects the size of the pipette tips via the rack coding. The optical sensor also detects if the pipette tips have a filter. However, the optical sensor does not use the coding to detect if the pipette tips are in racks, SafeRacks or in the Tip Holder.
7.4.1 epT.I.P.S. Motion Racks

Fig. 7-9: epT.I.P.S. Motion Rack

epT.I.P.S. Motion racks are intended for single use.

epT.I.P.S. Motion racks are specially designed for applications that require sterile work.

Tab. 7-2: epT.I.P.S. Motion racks are available in the following sizes:

<table>
<thead>
<tr>
<th>Size of the pipette tips</th>
<th>Dispensing tool</th>
<th>Color of the racks</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 µL</td>
<td>TS 50, TM 50</td>
<td>Light gray</td>
</tr>
<tr>
<td>300 µL</td>
<td>TS 300, TM 300</td>
<td>Yellow</td>
</tr>
<tr>
<td>1000 µL</td>
<td>TS 1000, TM 1000</td>
<td>Dark blue</td>
</tr>
</tbody>
</table>

Tab. 7-3: epT.I.P.S. Motion racks are available in the following purity grades:

<table>
<thead>
<tr>
<th>epT.I.P.S. Motion Racks</th>
<th>Purity grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipette tips with filter</td>
<td>PCR clean \ PCR clean and Sterile</td>
</tr>
<tr>
<td>Pipette tips without filter</td>
<td>Eppendorf Quality \ Sterile</td>
</tr>
</tbody>
</table>
7.4.2 epT.I.P.S. Motion Reloads

epT.I.P.S. Motion Reloads are intended for single use.

The pipette tips are in trays. The trays will be placed in reusable tip holders, which reduces waste because no racks are required.

Tab. 7-4: epT.I.P.S. Motion Reloads are available in the following sizes:

<table>
<thead>
<tr>
<th>Size of the pipette tips</th>
<th>Dispensing tool</th>
<th>Tray color</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 µL</td>
<td>TS 50, TM 50</td>
<td>Light gray</td>
</tr>
<tr>
<td>300 µL</td>
<td>TS 300, TM 300</td>
<td>Yellow</td>
</tr>
<tr>
<td>1000 µL</td>
<td>TS 1000, TM 1000</td>
<td>Dark blue</td>
</tr>
</tbody>
</table>

Tab. 7-5: epT.I.P.S. Motion Reloads are available in the following purity grades:

<table>
<thead>
<tr>
<th>epT.I.P.S. Motion Reloads</th>
<th>Purity grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipette tips with filter</td>
<td>PCR clean</td>
</tr>
<tr>
<td>Pipette tips without filter</td>
<td>Eppendorf Quality</td>
</tr>
</tbody>
</table>
7.4.3 Tip holder for epT.I.P.S. Motion Reloads

The tip holder is an adapter that holds the epT.I.P.S. Motion Reloads.

7.4.3.1 epT.I.P.S. Motion Reloads on the tip holder

1. Open the Reload packaging.
2. Remove the tray with the tips.
3. Place the tray on the tip holder. The notch in the tray must be on the labeled side of the tip holder.
7.4.4 epT.I.P.S. Motion SafeRacks

![Fig. 7-14: epT.I.P.S. Motion SafeRack](image)

**NOTICE! Contamination due to using incorrect pipette tips.**
The optical sensor does not detect if the pipette tips on the worktable are intended for single use (epT.I.P.S. Motion Rack, epT.I.P.S. Motion Reload) or multiple use (epT.I.P.S. Motion SafeRack).

- If the pipette tips will be used several times, equip the entire worktable with epT.I.P.S. Motion SafeRacks.

The epT.I.P.S. Motion in SafeRacks are intended for multiple use. If you use the pipette tips in an application, use epT.I.P.S. Motion SafeRacks, for example, to remove buffers in several washing steps.

epT.I.P.S. Motion SafeRacks have a partition to separate pipette tips. During an application, used pipette tips are returned to the SafeRack. A partition prevents residual liquid from contaminating adjacent pipette tips. Contamination of samples due to repeated use is prevented because the software permanently allocates the pipette tips within a specific application to a source vessel.

In the software, you can set whether pipette tips should be used multiple times (refer to epMotion software operating manual).

**Use epT.I.P.S. Motion SafeRacks for a maximum of 6 usage cycles. A usage cycle consists of aspiration, dispensing and ejecting the tip.**

**Tab. 7-6: epT.I.P.S. Motion SafeRacks are available in the following sizes:**

<table>
<thead>
<tr>
<th>Size of the pipette tips</th>
<th>Dispensing tool</th>
<th>Rack color</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 µL</td>
<td>TS 50, TM 50</td>
<td>Light gray</td>
</tr>
<tr>
<td>1000 µL</td>
<td>TS 1000, TM 1000</td>
<td>Dark blue</td>
</tr>
</tbody>
</table>

**Tab. 7-7: epT.I.P.S. Motion SafeRacks are available in the following purity grades:**

<table>
<thead>
<tr>
<th>epT.I.P.S. Motion SafeRacks</th>
<th>Purity grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipette tips with filter</td>
<td>PCR clean</td>
</tr>
<tr>
<td>Pipette tips without filter</td>
<td>Eppendorf Quality</td>
</tr>
</tbody>
</table>
Labware – vessels, plates and pipette tips
epMotion® 5070
English (EN)
8 Labware accessories

Vessels and accessories may not exceed an overall height of 126 mm. If this overall height is exceeded, the software generates an error message.

8.1 Racks

Racks are holders for mounting the same type of individual vessels.

8.1.1 Racks for 24 vessels

Various racks are available for vessels 12 mm – 17 mm in diameter. Racks are available in 2 heights. The bores for the vessels are numbered.

The racks cover the same area as plates. Racks can be positioned at any location.

Racks are coded. The optical sensor uses the code to detect if the rack is correctly positioned.
8.1.2 Rack for 96 vessels

The Rack 96 takes up 2 locations on the worktable. The rack holds 96 tubes without lids, with a volume of 1.5 mL or 2 mL.

8.1.2.1 Equipping Rack 96

The Rack 96 can be equipped with vessels with fastened lids, e.g., Safe-Lock tubes.

- If you equip the Rack 96 with Safe-Lock tubes, leave the second row of the rack open.
- Ensure that the lids do not cover the openings of adjacent vessels.

8.1.2.2 Placing the Rack 96 on the worktable

1. Place the Rack 96 on the epMotion workable so the opening in the lower panel points toward the user.
2. Place the Rack 96 on the positioning pins of the two locations.
8.1.3  Rack LC

![Rack LC 100 µL](image)

The Rack LC can hold 96 LightCycler capillaries with a 20 µL filling volume or 96 capillaries with a 100 µL filling volume. The bores for both sizes of capillary are arranged in an alternating pattern.

The Rack LC is labeled on both sides. The label on one side indicates the capillary size of 20 µL. The label on the other side indicates the capillary size of 100 µL.

8.1.3.1 Equipping the Rack LC and positioning it on the worktable

- Equip the Rack LC. Only use capillaries of the same size for a single application.
- Place the Rack LC on the epMotion worktable.
  The label that lists the size of the inserted capillary must point toward the user.

8.1.4  Thermorack and Rack 0.5/1.5/2.0 mL

![Thermorack 0.5 mL; 1.5 mL; 2 mL](image)  ![Rack 0.5 mL; 1.5 mL; 2 mL](image)

Thermoracks and the 0.5/1.5/2.0 mL racks have 24 bores for tubes with a volume of 1.5 mL and 2 mL. Vessels with a volume of 0.5 mL can be inserted with adapter sleeves.

Thermoracks and 0.5/1.5/2.0 mL racks have lid holders. The lid holders are on the right, next to the bore for the vessel. The lid holder vertically clamps the tube lids.

Thermoracks can be cooled in the lab refrigerator.
8.1.5 Reservoir Rack

The Reservoir Rack (4) is used to hold reservoirs (1) and Reservoir Rack modules (2). The Reservoir Rack columns are numbered (3).

The Reservoir Rack can hold a maximum of 7 reservoirs (1) or 7 different Reservoir Rack modules (2). Reservoir Racks can be loaded in any order.

8.1.5.1 Loading Reservoir Racks

The temperature control of the Reservoir Rack modules in the outer positions is not as good.

- Insert Reservoir Rack modules and reservoirs in the Reservoir Rack with the code facing the rear.

8.1.5.2 Positioning the Reservoir Rack on the worktable

- The Reservoir Rack cannot be placed at locations A1 or A2.
- Place the Reservoir Rack on the worktable so the Reservoir Rack tabs are positioned between the positioning pins for the location.
8.1.6 Reservoir Rack modules

Reservoir Rack modules are equipped with vessels and inserted into a Reservoir Rack. All of the vessels equipped in a Reservoir Rack module must be of the same type.

The Reservoir Rack modules TC are suitable for temperature control.

8.1.6.1 Connecting 30 mL/100 mL TC Reservoir Rack modules to an adjacent module

The 30 mL/100 mL TC Reservoir Rack modules must be mounted to the next Reservoir Rack module using 2 connecting bars.

- Insert the 2 connecting bars for the TC Reservoir Rack modules in the next Reservoir Rack modules.
8.1.6.2 Setting the Reservoir Rack module to vessel height

![Diagram showing the Reservoir Rack module and positioning screws.](image)

Fig. 8-9: Setting the Reservoir Rack module to vessel height

1. **Positioning screw**
   - In storage position

2. **Positioning screw**
   - At 50 mm height setting

The Reservoir Rack modules have bores 12 mm, 16 mm and 17 mm in diameter at the front and rear. The bores are mounted at 50 mm, 60 mm, 70 mm, 80 mm and 90 mm. Use the 2 positioning screws to position the vessels at these heights.

- Screw the 2 positioning screws into the bores at the required height.
Tab. 8-1: Temperature control duration of Reservoir Rack modules and reaction vessels

<table>
<thead>
<tr>
<th>Reservoir Rack module TC</th>
<th>Tube</th>
<th>Temperature change from 23°C to 4°C</th>
<th>Temperature change from 23°C to 37°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Set temperature</td>
<td>Temperature control time</td>
</tr>
<tr>
<td>RR module TC PCR 0.2 mL</td>
<td>PCR reaction vessel 0.2 mL</td>
<td>3°C</td>
<td>Approx. 15 min</td>
</tr>
<tr>
<td>RR module TC PCR 0.5 mL</td>
<td>PCR reaction vessel 0.5 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR module TC Safe-Lock</td>
<td>Safe-Lock tube 0.5 mL</td>
<td>3°C</td>
<td>Approx. 20 min</td>
</tr>
<tr>
<td>RR module TC Safe-Lock</td>
<td>Safe-Lock tube 1.5 mL</td>
<td>2 °C, 3°C</td>
<td></td>
</tr>
<tr>
<td>RR module TC Safe-Lock</td>
<td>Safe-Lock tube 2.0 mL</td>
<td>3°C, 3°C</td>
<td></td>
</tr>
<tr>
<td>RR module TC Ø 12 mm</td>
<td>Reaction vessel Ø 12 mm</td>
<td>3°C</td>
<td>Approx. 30 min</td>
</tr>
<tr>
<td>RR module TC Ø 16 mm</td>
<td>Reaction vessel Ø 16 mm</td>
<td>3°C</td>
<td></td>
</tr>
<tr>
<td>RR module TC Eppendorf</td>
<td>Tube 5 mL</td>
<td>3°C</td>
<td></td>
</tr>
<tr>
<td>tubes 5 mL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR module TC Ø 17 mm</td>
<td>Conical tube 15 mL</td>
<td>2 °C</td>
<td></td>
</tr>
<tr>
<td>RR module TC Ø 29 mm</td>
<td>Conical tube 50 mL</td>
<td>3°C</td>
<td>Approx. 39 min</td>
</tr>
<tr>
<td>RR module TC Ø 29 mm</td>
<td>Conical tube 50 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR Module TC Reservoir</td>
<td>Reservoir 30 mL</td>
<td>1°C</td>
<td>Approx. 21 min</td>
</tr>
<tr>
<td>30 mL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR Module TC Reservoir</td>
<td>Reservoir 100 mL</td>
<td>1°C</td>
<td>Approx. 46 min</td>
</tr>
<tr>
<td>100 mL</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table shows the time it takes to reach the set temperature with specific Reservoir Rack modules and reaction vessels, if the user has set the set temperature in the software.
8.2 Adapters

The following adapters are available for the epMotion:
- Height adapter
- Thermoadapter

8.2.1 Height adapter

Fig. 8-10: Height adapter

The height adapters are used to offset the various heights of the labware. The tool holder does not need to offset these height differences and remains at one height. The shorter paths of this tool holder allows the application to run more quickly.

The height of the adapter is listed on the adapter. The combined height of the labware and the adapter may not exceed 126 mm.

Tab. 8-2: Available height adapters

<table>
<thead>
<tr>
<th>Adapters</th>
<th>Use with</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 mm</td>
<td>• epT.I.P.S. Motion racks 50 µL and 300 µL in size</td>
</tr>
<tr>
<td>55 mm</td>
<td>• DWP plates</td>
</tr>
<tr>
<td></td>
<td>• 400 mL reservoirs</td>
</tr>
<tr>
<td></td>
<td>• Thermoblock with PCR plates</td>
</tr>
<tr>
<td>85 mm</td>
<td>• Almost all MTP plates with 6 – 384 wells</td>
</tr>
<tr>
<td></td>
<td>• Almost all PCR plates with 96 and 384 wells</td>
</tr>
<tr>
<td></td>
<td>• PCR thermoblock with PCR plates</td>
</tr>
</tbody>
</table>
8.2.2 Thermoadapter

Thermoadapters are adapters for plates that can be tempered. A thermoadapter can be tempered on the thermal module. Thermoadapters can be placed on the worktable with or without plates.

Thermoadapters are available for deepwell plates and PCR plates.

8.2.3 Thermoadapter LC samples

The Thermoadapter LC samples is a tube holder for automatically filling MagNA Pure LC Sample Cartridges. Thermoadapters and cartridges are a fixed combination for the epMotion.

The Thermoadapter LC Samples can be tempered up to 70 °C.
8.2.4 Thermoadapter Frosty

Fig. 8-13: Thermoadapter Frosty

The Thermoadapter Frosty cools samples.

The Thermoadapter Frosty is a modified height adapter which includes a PCR-Cooler. A PCR plate is placed on the Thermoadapter Frosty. The PCR-Cooler cools the samples in this plate. The Thermoadapter Frosty can only be used with skirted PCR plates.

Preparing and equipping the Thermoadapter Frosty

1. Cool the PCR-Cooler by placing the PCR-Cooler in the lab refrigerator with the upper side down.
2. Insert the PCR-Cooler in the Thermoadapter Frosty.
3. Place a PCR plate on the Thermoadapter Frosty.

The PCR-Cooler changes color if a temperature of 7 °C is exceeded. The color changes from purple to pink or from dark blue to light blue. The color value in the recesses of the PCR-Cooler is a decisive factor for cooling samples.
8.3 Thermoblocks and Thermoadapters for PCR plates

Fig. 8-14: PCR thermoblock 384
Fig. 8-15: Thermoblock PCR 96

A thermoblock consists of a thermoadapter and a removable plate. For the epMotion, the Thermoblock and the removable plate form a unit.

Store the thermoblock in the laboratory refrigerator to cool it.

Fig. 8-16: Thermoblock and thermoadapter comparison

The thermoadapter and thermoblock have different bar lengths.

<table>
<thead>
<tr>
<th>Thermoblock</th>
<th>Equipping</th>
<th>Filling volume per vessel</th>
<th>Heating period from 0°C to -10°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCR 96</td>
<td>96-well twin.tec PCR plate</td>
<td>150 µL</td>
<td>~ 14 min</td>
</tr>
<tr>
<td>PCR 384</td>
<td>384-well twin.tec PCR plate</td>
<td>25 µL</td>
<td>~ 10 min</td>
</tr>
</tbody>
</table>

8.3.1 Equipping the thermoblock with 0.2 mL vessels

Fig. 8-17: Tube lid rotated 45° to the surface of the thermoblock

- Arrange the vessels in columns. Leave every other column open for the tube lid.
  A maximum of 48 vessels with attached lids can be positioned in the thermoblock.
8.4 Waste container
8.4.1 Waste container

Fig. 8-18: Waste container

The waste container can hold up to 300 pipette tips up to 1000 µL in size.

8.4.1.1 Placing the disposal bag in the waste container

Use a disposal bag to protect the waste container from contamination.

Prerequisites
- Disposal bag
- Clamping ring

1. Place the disposal bag in the waste container
2. Fasten the disposal bag with the clamping ring.
3. Tightly pull the edge of the disposal bag downward.
   The dispensing tool and rack access will not be impeded.
8.4.2 LiquidWasteTub with lid

**WARNING! Danger due to contamination of the LiquidWasteTub.**
The outer surface of the LiquidWasteTub may become contaminated by pipette tips in the waste container.

- Wear personal protective equipment.
- Decontaminate the outer surface of the LiquidWasteTub.

The LiquidWasteTub is a container for liquid waste and is hung in the waste container. The LiquidWasteTub has a working volume of 115 mL.

The optical sensor detects if the LiquidWasteTub is present. The optical sensor also detects the filling level of the LiquidWasteTub.

The lid of the LiquidWasteTub prevents contamination from liquid waste splashes. The lid can only be used with single-channel dispensing tools. If you are working with multi-channel dispensing tools, remove the lid from the LiquidWasteTub.

The LiquidWasteTub can be reused. Decontamination and cleaning (see Decontamination and cleaning on p. 71).

The equipping of the waste container with the LiquidWasteTub must be defined in the software.
8.4.2.1 Using the LiquidWasteTub

**NOTICE! Risk of collisions due to loose LiquidWasteTub.**
If the LiquidWasteTub is not properly seated in the waste container, the dispensing tool may collide with the LiquidWasteTub when the tips are ejected.
- Always use the waste container with the clamping ring.

1. Place the disposal bag on the edge of the waste container (see p. 58).
2. Place the LiquidWasteTub on the edge of the waste container so that the tab of the LiquidWasteTub protrudes over the waste container clamping ring.
3. Place the lid on the LiquidWasteTub, if required.
4. Insert the waste container in the epMotion in such a way that the LiquidWasteTub is on the right-hand side.
9 Operation
9.1 First steps

This chapter describes how to operate the epMotion and how to execute applications.

- Information on how to create applications is available in the software operating manual.

9.1.1 Switching on the epMotion

Prerequisites
- The epMotion has been installed and commissioned by skilled personnel authorized by Eppendorf.

epMotion5070
1. Close the front hood.

epMotion5070f
2. Bring the front screen of the Cleanbench into the working position.
   - The light barrier is generated.

epMotion 5070 and 5070f
3. Switch on the device at the mains power switch.
   - The EasyCon starts and displays the start screen.
   - The carrier travels to the home position.
   - The epMotion is ready for operation.

9.1.2 Using the EasyCon

You can find a detailed description of the EasyCon in the software operating manual.

9.1.2.1 Touch-sensitive screen (touch panel)

- Touch the screen with your finger.
  - You can also wear thin rubber gloves when operating the EasyCon.
- Alternatively, you can use a stylus which is suitable for capacitive touch panels.

9.1.2.2 Mouse

You can either use a mouse only or use it in addition to the touch-sensitive EasyCon screen.

- Connect the USB mouse to one of the USB ports.
  - The mouse arrow will appear on the screen as soon as the EasyCon has recognized the mouse.
9.1.2.3 Data exchange

**NOTICE! Data loss and malfunction due to malicious software.**
Malicious software (e.g., a computer virus) on the USB storage medium can be transferred to the EasyCon.
- Before connecting the USB storage medium to the EasyCon, check the USB storage medium using a current antivirus software.

**NOTICE! Data loss due to missing data backup or incorrect storage of storage media.**
User accounts, applications, labware and protocols are saved in a database. If this database becomes damaged (e.g., due to a hardware defect), this information will be lost. Eppendorf is not liable for data loss or any associated damages.
- Regularly backup your database using the backup function in the software.
- Save the secured data on an external storage medium.
- Store the external storage media according to the manufacturer’s specifications.

**NOTICE! Malfunction due to third-party software.**
Third-party software can impair the functioning of the epBlue software.
- Only install software approved by Eppendorf.

You need a USB storage medium in order to exchange and backup data.

1. Connect the USB storage medium to one of the USB ports.
   The storage medium is ready for operation after 5 seconds.
2. Execute the required function in the software (refer to epMotion software operating manual).

9.1.3 Using the epMotion

The epMotion workflow consists of the following steps.

1. Create an application (refer to epMotion software operating manual).
2. Equip the worktable (see p. 63).
3. Execute the application (see p. 66).
4. Complete your work (see p. 69).

Step 1 is described in the software operating manual. Steps 2 to 4 are described in the following sections.
9.2 Loading the worktable

To prepare the epMotion for an application, perform the following steps:
• Display the loading in the software
• Positioning tools
• epT.I.P.S. Motion
• Position the waste container
• Position labware

9.2.1 Display the loading

**NOTICE! Tool collisions with incorrectly positioned labware.**
Labware must be positioned on the epMotion worktable as defined in the application. Tools and labware become damaged in a collision. A collision can lead to sample loss.

- Check the positioning of the labware before starting the application.

To display the loading of the worktable, proceed as follows.

1. Open the application.
2. Select the area or the Run (refer to epMotion software operating manual) step.

Fig. 9-1: Overview of tools and labware on the worktable

The epBlue worktable displays the required equipping of the epMotion worktable graphically.

3. Equip the epMotion worktable as displayed.
   Details on equipping can be found in the following chapters.
9.2.2 Positioning tools on the worktable

**NOTICE! Damage to the gold contacts from handling.**
The tool is damaged if the gold contacts on the tool become damaged or contaminated.
- Do not touch the gold contacts.

9.2.2.1 Dispensing tools

When the application is started, epMotion checks if the required tools are available. You can choose the order of the dispensing tools freely.
- Place the dispensing tool with the gold contact at the rear right of one of the T1 to T2 holders.

9.2.3 Positioning the epT.I.P.S. Motion on the worktable

Observe the instructions for use for the epT.I.P.S. Motion Racks and epT.I.P.S. Motion Reloads.

**NOTICE! Dispensing error due to incorrect handling of pipette tips.**
Tips become deformed and change size during autoclaving.
- Do not autoclave the pipette tips. Use tips with the sterile specification, if required.
- Do not stack any racks that contain pipette tips.

**NOTICE! Incorrect stock detection due to missing pipette tips.**
The optical sensor checks the start position and end position of the pipette tips in the rack. The optical sensor does not check if pipette tips are missing in the center.
- Do not remove any pipette tips from the rack.

**NOTICE! Contamination due to using incorrect pipette tips.**
The optical sensor does not detect if the pipette tips on the worktable are intended for single use (epT.I.P.S. Motion Rack, epT.I.P.S. Motion Reload) or multiple use (epT.I.P.S. Motion SafeRack).
- If the pipette tips will be used several times, equip the entire worktable with epT.I.P.S. Motion SafeRacks.

The optical sensor detects the type of pipette tips using the coding on the tray. The epMotion removes the pipette tips from the rack column by column. Additional information is available on the epT.I.P.S (see p. 41)

1. When using epT.I.P.S. Motion Reloads, place the tray on the tip holder.
2. Place the rack or tip holder on the worktable location with the label pointing toward the front.
3. Remove the lid.
9.2.4 Positioning the waste container on the worktable

1. Place the disposal bag in the waste container (see p. 58).
2. If required, insert the Liquid Waste Tub in the waste container (see p. 60).
3. Place the waste container in the epMotion.

9.2.5 Positioning labware on the worktable

---

NOTICE! Collision or dispensing error due to uneven and tilted labware.
Labware must be positioned evenly on the worktable.
- Do not tilt the labware.
- Place warped PCR plates on a thermostatic adapter or thermostatic block.

NOTICE! Collision with tube lids.
If the lid blocks the tube opening, it may collide with the dispensing tool.
- Position the tube lid so the tube opening is not covered.

---

You can find information on special positioning features in the Labware chapter (see Labware accessories on p. 47).

9.2.5.1 Tubes

1. Open the tubes.
2. Place the tubes vertically in the racks.
   - Place tubes with lids in racks with lid fixture only.
3. Lock the attached lids in the lid fixtures on the rack.

9.2.5.2 Reservoir Rack modules

- Place the ReservoirRack Module in the ReservoirRack (see p. 50).

9.2.5.3 Plates, racks and adapters

The labware may not have any play at the epMotion worktable location.

1. Align the labware.
   - Align the racks and adapters on the worktable in such a way that the writing faces the user.
   - Align the plates on the worktable in such a way that position A1 of the plate is located at the rear on the left.
Plates, racks, epT.I.P.S Motion racks and Thermoadapters

2. Position the labware in such a way that the spring clip holder pushes the labware against the positioning pins. The labware must touch the positioning pins of the location.

3. If required, tension the spring clip holder by hand.

Height adapter, Tip Holder und Reservoir Rack

4. Place the height adapter, Tip Holder and Reservoir Rack over the positioning pins.

9.3 Executing an application

Details on starting and controlling applications can be found in the software operating manual.

9.3.1 Performing a test run

If you are executing an application for the first time, perform a test run.

Perform a test run with a liquid which has physical properties that are similar to the liquid for the application.

Check the application as follows:

1. Fill the labware with the correct dispensing quantity of demineralized water or a different test liquid.
2. Equip the epMotion worktable with labware and tools.
3. Activate the optical sensor.
4. Fully execute the application.
5. Check to see if the application was executed without errors.
   - The dispensing is precise and correct.
   - No liquid sprays out of the reaction vessels. Contamination is unlikely.

Additional information on optimizing the dispensing can be found in the software operating manual.
9.3.2 Starting the application

**NOTICE! Faulty level detection due to air bubbles.**
If there are air bubbles in the vessels, the optical sensor reads the level incorrectly.

- Check to see if there are air bubbles in the vessels before starting the application.
- To remove air bubbles, carefully tap the labware on the work surface.

**Prerequisites**
- Application is selected.
- Worktable is equipped (see p. 63).

1. Start the application.
2. Select the optical sensor settings for this run.

The following functions of the optical sensor can be activated:

- **Liquid detection**
  Determines the filling level for positions of labware, which has the Liquid detection option activated.

- **Tip detection**
  Checks to see if the pipette tips defined in the application are available.
  Determines the quantity and position of tips in the rack.
  Works only with epT.I.P.S. Motion in TipHolders and Racks from Eppendorf.

- **Location detection**
  Detects the labware coding.
  Checks to see if the labware on the epMotion worktable matches the labware on the epBlue worktable.

A detailed description of the optical sensor and its functions can be found in the software operating manual.

3. For applications with a variable sample quantity, enter the number of samples.
4. If the level detection is deactivated, enter the filling volume of the vessels in µL.
   • The epMotion checks if the required tools are available.
   • If necessary, the optical sensor checks the labware and levels.
   • The application is executed. The software displays the status of the application.

9.3.3 Controlling the application run

**CAUTION! Risk of injury due to carrier movement.**
The carrier may still be moving when the front hood of the epMotion is opened.

- Wait until the carrier stops moving before reaching into the device.
9.3.3.1 Stopping the application immediately

To stop the application immediately, e.g., at risk of collision, proceed as follows:

**epMotion5070**
- Open the front hood.
  - The application will be stopped immediately.

**epMotion5070f**
- Move the front screen of the Cleanbench up or down.
  - The front screen moves from the working position. The light barrier is interrupted. The application will be stopped immediately.

**epMotion 5070 and 5070f**
- You can continue or abort the application.

9.3.3.2 Interrupting the application

- Stop the application using the *Stop application* button (refer to epMotion software operating manual).
  - The current movement will be ended. Then the application stops.
- You can continue or abort the application.

9.3.3.3 Continuing the application

**Prerequisites**
- The equipping of the worktable has not been changed.
- The levels of the vessels has not been changed.
- The carrier has not been moved by hand.

1. Close the safety screen.
2. Continue the application using the *Continue application* button (refer to epMotion software operating manual).
9.3.3.4 Aborting the application

**NOTICE! Contamination due to multiple use of pipette tips.**
When you abort an application with multiple use of pipette tips, the epT.I.P.S. Motion SafeRacks contain used pipette tips. The epMotion does not detect which pipette tips have already been used.
- Dispose of epT.I.P.S. Motion SafeRacks immediately after the application has been aborted.

An application cannot be continued after it has been aborted.

**Prerequisites**
- The application was stopped or interrupted.
- Abort the application using the *Abort application* button (refer to epMotion software operating manual).
  - The application will be aborted.
  - The tool holder returns the tool to its original location.
  - The carrier travels to the home position.
  - The epMotion is ready for operation.
- You can start a new application.

9.4 Completing your work
9.4.1 Cleaning up the worktable

**WARNING! Danger due to flammable and infectious liquids in the waste container.**
Pipette tips in the waste container may contain flammable or infectious liquids.
- Wear personal protective equipment.
- Handle the pipette tips and sample materials from the waste container in accordance with the material safety data sheets, safety regulations and laboratory guidelines.

**WARNING! Danger due to contamination of the LiquidWasteTub.**
The outer surface of the LiquidWasteTub may become contaminated by pipette tips in the waste container.
- Wear personal protective equipment.
- Decontaminate the outer surface of the LiquidWasteTub.

Complete the following steps after the end of the application.

1. Seal the vessels.
2. Remove the labware from the worktable.
3. Empty the waste container.
4. If necessary, decontaminate the device and labware (see *Decontamination and cleaning on p. 71*).
9.4.2 Switching off the epMotion

**NOTICE! Data loss due to incorrect power-off of the epMotion.**
If you switch off the epMotion without ending the running processes, data will be lost.
- Switch off the device as described in the operating manual.

Proceed as follows.
1. Exit epBlue (refer to epMotion software operating manual).
   The EasyCon switches off. The display becomes dark.
2. Switch off the epMotion using the mains power switch.
10 Maintenance

10.1 Decontamination and cleaning

**WARNING!** Danger due to flammable and infectious liquids in the waste container.

Pipette tips in the waste container may contain flammable or infectious liquids.

- Wear personal protective equipment.
- Handle the pipette tips and sample materials from the waste container in accordance with the material safety data sheets, safety regulations and laboratory guidelines.

**WARNING!** Danger due to contamination of the LiquidWasteTub.

The outer surface of the LiquidWasteTub may become contaminated by pipette tips in the waste container.

- Wear personal protective equipment.
- Decontaminate the outer surface of the LiquidWasteTub.

**NOTICE!** Material damage from corroding cleaning agents.

Cleaning and decontamination agents may contain corroding substances. Metal surfaces on the epMotion become damaged by corrosion.

- Use the cleaning agents and disinfectants specified in the operating manual.

The device is cleaned as described in the Decontamination section.

Tab. 10-1: Decontamination methods and decontamination agents

<table>
<thead>
<tr>
<th>Decontamination method</th>
<th>Decontamination agent</th>
<th>For use on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wipe decontamination</td>
<td>70% (v/v) ethanol</td>
<td>Worktable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waste container</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LiquidWasteTub</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Housing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Work surface adapter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reflectors and sensor cover on the Cleanbench</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EasyCon Control-Panel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Labware</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tools</td>
</tr>
<tr>
<td></td>
<td>3%–4% sodium hypochlorite</td>
<td>Waste container</td>
</tr>
<tr>
<td></td>
<td>solution</td>
<td>LiquidWasteTub</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dispensing Tools</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Racks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thermoblocks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thermoadapter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Height adapter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TipHolder</td>
</tr>
</tbody>
</table>
### 10.1.1 Carrying out wipe decontamination

**Prerequisites**
- Decontamination agent
- Deionized water
- Lint-free cloths
- Cotton swabs

**Cleaning the device**
1. Switch off the device and disconnect it from the mains/power line.
2. Moisten the lint-free cloth and cotton swab with decontamination agent.
3. Clean the surface with a lint-free cloth. Clean hard to access surfaces with cotton swabs.
   - The surfaces are dampened with a decontamination agent.
4. Allow the decontamination agent to take effect.
5. Wipe the decontamination agent with deionized water.
6. Allow the surfaces to dry.

**Cleaning the dispensing tools**
7. Pull of the ejector from the single-channel dispensing tool.

### Table: Decontamination methods

<table>
<thead>
<tr>
<th>Decontamination method</th>
<th>Decontamination agent</th>
<th>For use on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spray decontamination outside the device</td>
<td>70% (w/v) ethanol</td>
<td>Waste box, LiquidWasteTub, Racks, Thermoblocks, Thermoadapter, Height adapter, TipHolder</td>
</tr>
</tbody>
</table>
| UV radiation via Cleanbench             | UV light of the Cleanbench
   Irradiation period 15 min
   If you are using UV irradiation regularly, the epMotion must be serviced annually by Eppendorf Service. | Worktable without labware and tools |
| Autoclaving                             | 121 °C
   100 kPa overpressure
   20 min                                   | Waste box, LiquidWasteTub, Dispensing Tools, Racks, Thermoblocks, Thermoadapter, Height adapter, TipHolder |
8. Clean and decontaminate the dispensing tools.
   The wipe decontamination of the dispensing tools is identical to the wipe decontamination of the device.

10.1.2 Carrying out spray decontamination

**NOTICE! Damage on the device due to ingress of liquids by spray decontamination.**

- Do not perform spray decontamination in and on the device. Use the decontamination methods provided in the operating manual.
- When you labware and tools, remove labware and tools from the device beforehand.

**Prerequisites**

- Decontamination agent in spray bottle
- Deionized water

1. Remove Labware and tools from the device.
2. Spray the surfaces with decontamination agent.
3. Allow the decontamination agent to take effect.
4. Wipe the decontamination agent with deionized water.
5. Allow the surfaces to dry.
10.1.3 Autoclaving

**NOTICE! Damage on the tool due to autoclaving.**
The tool will be damaged if the temperature in the autoclave is too high.

- Make sure the temperature in the autoclave is 121 °C – 126 °C.
- Make sure the tools do not touch the wall of the autoclave.

**Prerequisites**

- The temperature in the autoclave is 121 °C.
- 100 kPa overpressure is present in the autoclave.
- Chemical decontamination agents are removed completely.

1. Autoclave tools and labware for 20 min.
2. Rinse the tools and labware with deionized water.
3. Let the tools and labware dry.

10.2 Decontamination before shipment

**WARNING! Risk to health from contaminated device**

1. Follow the instructions in the decontamination certificate. It is available as a PDF file on our webpage (www.eppendorf.com/decontamination).
2. Decontaminate all the parts you would like to dispatch.
3. Include the fully completed decontamination certificate in the package.

10.3 Servicing the device

The Eppendorf AG service team is available to service and certify your device.

The service provisions include:

- Installation qualification (IQ) and operational qualification (OQ)
- Preventive maintenance
- Calibration and validation

Information on the services offered can be found on our webpage: www.eppendorf.com/epservices.

- Have every dispensing tool serviced after 100,000 full strokes or 200,000 strokes.
- If you radiate your device regularly with UV light, you have to service this device every year.
10.4 Fuses

Fuses may only be replaced by authorized service technicians. Users must not replace the fuses.

10.5 Carrying out firmware updates

NOTICE! Malfunctions due to faulty firmware.
- Firmware updates only be conducted upon request by Eppendorf AG.
- Only use firmware you have received from Eppendorf AG.

Prerequisites
- The firmware is located on a USB storage medium.
- The device is switched off and disconnected from the mains/power line.

1. Connect the USB storage medium to a USB port on the rear of the epMotion.
2. Switch on the epMotion.
   The epMotion automatically installs the firmware.
3. Wait until the epMotion has emitted 3 short signal tones.
4. Exit epBlue (refer to epMotion software operating manual).
   The EasyCon switches off. The display becomes dark.
5. Switch off the epMotion.
6. Remove the USB storage medium.

10.6 Checking the dispensing volume

When you use liquids with a density greatly different from that of water, the dispensing volume may be incorrect. Physical properties, such as the viscosity, vapor pressure and surface tension of the liquid, affect the dispensing volume.

Correct the dispensing volume for these liquids. Gravimetrically check the dispensing of the epMotion and correct the dispensing if necessary.

Perform the following check.
1. Call up the application.
2. Adjust the application to your labware and dispensing tool.
3. Fill the source vessel with distilled water.
5. Run the application.
   The labware will be filled with water.
7. Calculate the volume of the water. Volume = mass / density.
8. Check to see if the dispensing tool dispenses liquid without errors by comparing the calculated volume of water with the dispensing volume of the dispensing tool.

9. Repeat the check with test liquid and new labware.


11. Compare the volume of the water to the volume of the test liquid.

12. Change the volume(s) if necessary.

Changing the density by 10% will change the dispensing result by approx. 0.2%-1%.

10.7 Maintaining the dispensing tools

**NOTICE! Dispensing error due to missing service.**
To ensure dispensing according to specifications, each dispensing tool must be serviced after 100,000 full strokes or 200,000 strokes. epBlue displays a message if a dispensing tool has reached 100,000 full strokes or 200,000 strokes.

- Have the dispensing tool serviced after 100,000 full strokes or 200,000 strokes.
- Send the dispensing tool to your Eppendorf AG service partner.

10.7.1 Exchanging the sealing rings on the eight-channel dispensing tool

Exchange the sealing ring at the described intervals and if the following problems occur:
- Sealing rings are damaged.
- Tips are not attached parallel.
- Tips are dripping.
- Once a year.

**NOTICE! Damage to the gold contacts from handling.**
The tool is damaged if the gold contacts on the tool become damaged or contaminated.

- Do not touch the gold contacts.
Exchange the sealing rings as follows:

**Prerequisites**
- New sealing ring
- Auxiliary tool
- Mounting aid
- Damp, lint-free cloth

1. Place the edge of the auxiliary tool at the height of the sealing ring.
2. Use the auxiliary tool to cut the sealing rings on the dispensing tool.
3. Remove the sealing rings with the fingers.
4. Clean all tip cones with a damp, lint-free cloth.
5. Attach the new sealing ring with the mounting aid.
6. Position the sealing rings in the grooves of the tip cones.

### 10.8 Customer service functions

Customer service functions are available to service and check your device. The following functions can be carried out:

<table>
<thead>
<tr>
<th>Customer service function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical Sensor</td>
<td>Define the functions of the optical sensor</td>
</tr>
<tr>
<td>Tool interlock</td>
<td>Check the interlocking mechanism of the tools.</td>
</tr>
<tr>
<td>Dosing device</td>
<td>Read out the number of stroke movements of a dispensing tool.</td>
</tr>
</tbody>
</table>

The software operating manual contains a detailed description of the functions.
11  Troubleshooting

If you cannot remedy an error with the recommended measures, please contact your local Eppendorf partner. The contact address can be found online at: www.eppendorf.com/worldwide.

11.1  Error search

If an application does not start, check the following items:

**Device**
- Is the safety screen fully closed?

**Tools**
- Are the required dispensing tools available?
- Have the tools been correctly hung in the holder?

**Worktable**
- Is the labware displayed in the software identical to the labware on the epMotion worktable?
- Is the labware at the location shown on the display?
- Are all locations which are shown as empty in the software actually empty on the epMotion worktable?

**Labware**
- Is the labware correctly inserted?
- Is the labware inserted in the wrong direction?
- Are you using the correct height adapter?
- Are all vessels open?
- Are the epT.I.P.S. Motion racks sufficiently filled with pipette tips?
- Have the lids of the epT.I.P.S. Motion racks been removed?
- Are the lids of the Safe-Lock tubes positioned correctly?
- Are the required filling quantities in the source vessels?
- Are racks or plates that will be required later prepared in the park positions?
- Has the volume of the racks or plates, which will be required later, been entered in the application?

**Waste container**
- Is the waste container empty?
- Is the bag correctly positioned in the waste container?
- Is the clamping ring flush?
- Does the bag protrude over locations B1 or A1?
- Can the bag hold the required number of tips?

**Cleanbench**
- Are the reflectors on the door of the Cleanbench in good condition?
- Has the device been positioned in the correct angle to the reflectors?
### 11.2 General errors

#### 11.2.1 Optical sensor errors

<table>
<thead>
<tr>
<th>Symptom/message</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The optical sensor does not detect the labware.</td>
<td>Plates are not positioned plane on the worktable. Plates were inserted in the wrong direction.</td>
<td>▶ Check to see if the labware is correctly inserted in the locations.</td>
</tr>
<tr>
<td>The optical sensor does not detect a plastic plate.</td>
<td>Plastic surface is uneven.</td>
<td>▶ Wipe the plate several times using a damp cloth. ▶ Carry out a <em>Location</em> detection with a damp plate.</td>
</tr>
<tr>
<td>The optical sensor does not detect the pipette tips.</td>
<td>The rack is not correctly positioned with pipette tips.</td>
<td>▶ Position the rack so that the label faces the front. ▶ Position the Rack 96 so that the opening in the lower panel faces the user.</td>
</tr>
<tr>
<td>The optical sensor does not detect the level.</td>
<td>The surface of the liquid is not plane (strong meniscus formation).</td>
<td>▶ Smooth the surface by carefully tapping the rack or plate on the table.</td>
</tr>
<tr>
<td></td>
<td>There are bubbles or foam on the surface of the liquid.</td>
<td>▶ Remove bubbles or foam.</td>
</tr>
</tbody>
</table>
### 11.2.2 Dispensing errors

<table>
<thead>
<tr>
<th>Symptom/message</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The dispensing tool dispenses</td>
<td>• The sealing rings on the dispensing tool are broken.</td>
<td>▶ Replace the sealing rings on the dispensing tool.</td>
</tr>
<tr>
<td>incorrectly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dispensing volume too high.</td>
<td>During retraction, the opening of the pipette tip is in the liquid in</td>
<td>• Use the optical sensor to determine the volume.</td>
</tr>
<tr>
<td></td>
<td>the source vessel. There are no air bubbles on the lower end of the</td>
<td>▶ Enter the correct volume.</td>
</tr>
<tr>
<td></td>
<td>pipette tip when liquids are being transported.</td>
<td>▶ Avoid plates with very different well filling heights.</td>
</tr>
<tr>
<td></td>
<td>• The actual liquid volume in the source vessel is higher than the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>entered volume.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Liquid refilled after the application was started.</td>
<td>▶ Do not refill liquid after the application has started.</td>
</tr>
<tr>
<td></td>
<td>• Incorrect labware used.</td>
<td>▶ Use the labware that was selected in the application software.</td>
</tr>
<tr>
<td>Dispensing volume too low.</td>
<td>The pipette tip draws in air. There are air bubbles in the pipette</td>
<td>• Use the optical sensor to determine the volume.</td>
</tr>
<tr>
<td></td>
<td>tip.</td>
<td>▶ Enter the correct volume.</td>
</tr>
<tr>
<td></td>
<td>• The actual liquid volume in the source vessel is lower than the</td>
<td>▶ Avoid plates with very different well filling heights.</td>
</tr>
<tr>
<td></td>
<td>entered volume.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Incorrect labware used.</td>
<td>▶ Use the labware that was selected in the application software.</td>
</tr>
<tr>
<td>Residual liquid in pipette tip.</td>
<td>• Incorrect volume specification in the destination vessel.</td>
<td>• Use the optical sensor to determine the volume.</td>
</tr>
<tr>
<td></td>
<td>• After dispensing, the liquid will be withdrawn from the destination</td>
<td>▶ Enter the correct volume.</td>
</tr>
<tr>
<td></td>
<td>vessel to the pipette tip.</td>
<td>▶ Avoid plates with very different well filling heights.</td>
</tr>
<tr>
<td></td>
<td>• Incorrect liquid class selected.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Inappropriate dispensing parameter.</td>
<td>▶ Select the liquid class that matches the liquid.</td>
</tr>
<tr>
<td></td>
<td>▶ Optimizing dispensing parameters (refer to epMotion software</td>
<td>▶ Optimizing dispensing parameters (refer to epMotion software</td>
</tr>
<tr>
<td></td>
<td>▶ Liquid wets the pipette tip.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▶ Liquid tends to foam.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▶ For several dispensing steps, exchange the pipette tip more often.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▶ Optimizing dispensing parameters (refer to epMotion software</td>
<td></td>
</tr>
<tr>
<td></td>
<td>operating manual).</td>
<td></td>
</tr>
</tbody>
</table>

### 11.2.3 Software errors

The software operating manual contains a description of software error messages.
12 Transport, storage and disposal

12.1 Transport

CAUTION! Risk of injury due to lifting and carrying heavy loads
The device is heavy. Lifting and carrying the device can lead to back injuries.
- Transport and lift the device with an adequate number of helpers only.
- Use a transport aid to transport the device.

- Use the original packaging and the transport securing devices for transport.

<table>
<thead>
<tr>
<th></th>
<th>Air temperature</th>
<th>Relative humidity</th>
<th>Atmospheric pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>General transport</td>
<td>-25 °C – 60 °C</td>
<td>10 % – 75 %</td>
<td>30 kPa – 106 kPa</td>
</tr>
<tr>
<td>Air freight</td>
<td>-20 °C – 55 °C</td>
<td>10 % – 75 %</td>
<td>30 kPa – 106 kPa</td>
</tr>
</tbody>
</table>

The center of gravity of the device is at the rear.

Yellow carrying straps are attached to the device upon delivery.
- Use the yellow carrying straps to lift the device out of the packing and position it.

12.2 Storage

<table>
<thead>
<tr>
<th></th>
<th>Air temperature</th>
<th>Relative humidity</th>
<th>Atmospheric pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>In transport packaging</td>
<td>-25 °C – 55 °C</td>
<td>10 % – 95 %</td>
<td>70 kPa – 106 kPa</td>
</tr>
<tr>
<td>Without transport packaging</td>
<td>-5 °C – 45 °C</td>
<td>10 % – 95 %</td>
<td>70 kPa – 106 kPa</td>
</tr>
</tbody>
</table>
12.3 Disposal

In case the product is to be disposed of, the relevant legal regulations are to be observed.

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

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

According to these regulations, any devices supplied after August 13, 2005, in the business-to-business sphere, to which this product is assigned, may no longer be disposed of in municipal or domestic waste. To document this, they have been marked with the following identification:

![Disposal Mark]

Because disposal regulations may differ from one country to another within the EU, please contact your supplier if necessary.

In Germany, this is mandatory from March 23, 2006. From this date, the manufacturer has to offer a suitable method of return for all devices supplied after August 13, 2005. For all devices supplied before August 13, 2005, the last user is responsible for the correct disposal.
13 Technical data

13.1 Power supply

<table>
<thead>
<tr>
<th>Voltage</th>
<th>100 V – 240 V ±10 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuses</td>
<td>10 AT / 250 V</td>
</tr>
<tr>
<td>Frequency</td>
<td>50 Hz – 60 Hz ±5 %</td>
</tr>
<tr>
<td>Power consumption in standby mode</td>
<td>50 W</td>
</tr>
<tr>
<td>Power consumption maximum</td>
<td>150 W</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>II (IEC 610 10-1)</td>
</tr>
<tr>
<td>Degree of contamination</td>
<td>2</td>
</tr>
<tr>
<td>Protection class</td>
<td>1</td>
</tr>
</tbody>
</table>

13.2 Ambient conditions

<table>
<thead>
<tr>
<th>Ambience</th>
<th>Only for use indoors.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>15 °C – 35 °C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>55 % – 75 %, non-condensing.</td>
</tr>
<tr>
<td>Atmospheric pressure</td>
<td>86 kPa – 106 kPa</td>
</tr>
<tr>
<td></td>
<td>Use up to a height of 2 000 m above sea level.</td>
</tr>
</tbody>
</table>

13.3 Weight/dimensions

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Width: 65 cm (25.6 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Depth: 48 cm (18.9 in)</td>
</tr>
<tr>
<td></td>
<td>Height: 63 cm (24.8 in)</td>
</tr>
<tr>
<td>Weight</td>
<td>5070: 45 kg (99.2 lb)</td>
</tr>
<tr>
<td></td>
<td>5070f: 33 kg (72.8 lb)</td>
</tr>
</tbody>
</table>

13.4 Noise level

| Noise level                     | typically 53 dB (A)         |

13.5 Interfaces

<table>
<thead>
<tr>
<th>USB</th>
<th>USB 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet</td>
<td>Ethernet 100 MBit/s</td>
</tr>
</tbody>
</table>

Only devices which meet the requirements of IEC 950/EN 60950-1 (UL 1950) standards may be connected to the interfaces.
13.6 EasyCon

<table>
<thead>
<tr>
<th>Touch panel</th>
<th>Capacitive touch panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>LCD color display</td>
</tr>
<tr>
<td>Display size</td>
<td>25.4 cm (10 in)</td>
</tr>
<tr>
<td>Resolution</td>
<td>1024 x 600 pixels</td>
</tr>
<tr>
<td>Weight</td>
<td>1.3 kg (2.87 lb)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Length: 29 cm (11.4 in)</td>
</tr>
<tr>
<td></td>
<td>Depth: 18 cm (7 in)</td>
</tr>
<tr>
<td></td>
<td>Height: 8 cm (3.2 in)</td>
</tr>
<tr>
<td>Power supply</td>
<td>Via Ethernet cable</td>
</tr>
<tr>
<td>Interfaces</td>
<td>USB 2.0</td>
</tr>
<tr>
<td></td>
<td>Ethernet 100 MBit/s</td>
</tr>
</tbody>
</table>

Only devices which meet the requirements of IEC 950/EN 60950-1 (UL 1950) standards may be connected to the interfaces.

13.7 Additional specifications

13.7.1 Optical sensor

<table>
<thead>
<tr>
<th>Optical confocal infrared sensor</th>
<th>Non-contact detection of</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Filling levels</td>
</tr>
<tr>
<td></td>
<td>• Labware coding and labware height</td>
</tr>
<tr>
<td></td>
<td>• Equipping the racks with pipette tips</td>
</tr>
</tbody>
</table>

Detection conditions

90 ± 3° liquid surface to the optical axis
Minimum fill level 3 mm

13.7.2 Carrier

<table>
<thead>
<tr>
<th>X-Y-Z axis positioning accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systematic error</td>
</tr>
<tr>
<td>Random error</td>
</tr>
<tr>
<td>Working space</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
### 13.8 Dispensing tool errors

#### 13.8.1 Pipetting

<table>
<thead>
<tr>
<th>Dispensing tool</th>
<th>Volume range Pipetting</th>
<th>Testing volume</th>
<th>Error limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 µL</td>
<td>Systematic error</td>
</tr>
<tr>
<td>TS 50</td>
<td>1.0 µL – 50 µL</td>
<td>±15.0</td>
<td>±0.15</td>
</tr>
<tr>
<td></td>
<td>5 µL</td>
<td>±5.0</td>
<td>±0.25</td>
</tr>
<tr>
<td></td>
<td>25 µL</td>
<td>±1.5</td>
<td>±0.375</td>
</tr>
<tr>
<td></td>
<td>50 µL</td>
<td>±1.0</td>
<td>±0.5</td>
</tr>
<tr>
<td>TS 300</td>
<td>20 µL – 300 µL</td>
<td>±4.0</td>
<td>±0.8</td>
</tr>
<tr>
<td></td>
<td>30 µL</td>
<td>±3.0</td>
<td>±0.9</td>
</tr>
<tr>
<td></td>
<td>150 µL</td>
<td>±1.0</td>
<td>±1.5</td>
</tr>
<tr>
<td></td>
<td>300 µL</td>
<td>±0.6</td>
<td>±1.8</td>
</tr>
<tr>
<td>TS 1000</td>
<td>40 µL – 1 000 µL</td>
<td>±5.0</td>
<td>±2.0</td>
</tr>
<tr>
<td></td>
<td>100 µL</td>
<td>±2.0</td>
<td>±2.0</td>
</tr>
<tr>
<td></td>
<td>500 µL</td>
<td>±1.0</td>
<td>±5.0</td>
</tr>
<tr>
<td></td>
<td>1 000 µL</td>
<td>±0.7</td>
<td>±7.0</td>
</tr>
<tr>
<td>TM 50-8</td>
<td>1.0 µL – 50 µL</td>
<td>±25.0</td>
<td>±0.25</td>
</tr>
<tr>
<td></td>
<td>5 µL</td>
<td>±5.0</td>
<td>±0.25</td>
</tr>
<tr>
<td></td>
<td>25 µL</td>
<td>±2.0</td>
<td>±0.5</td>
</tr>
<tr>
<td></td>
<td>50 µL</td>
<td>±1.2</td>
<td>±0.6</td>
</tr>
<tr>
<td>TM 300-8</td>
<td>20 µL – 300 µL</td>
<td>±10.0</td>
<td>±2.0</td>
</tr>
<tr>
<td></td>
<td>30 µL</td>
<td>±10.0</td>
<td>±3.0</td>
</tr>
<tr>
<td></td>
<td>150 µL</td>
<td>±2.5</td>
<td>±3.75</td>
</tr>
<tr>
<td></td>
<td>300 µL</td>
<td>±1.5</td>
<td>±4.5</td>
</tr>
<tr>
<td>TM 1000-8</td>
<td>40 µL – 1 000 µL</td>
<td>±6.0</td>
<td>±2.4</td>
</tr>
<tr>
<td></td>
<td>100 µL</td>
<td>±3.0</td>
<td>±3.0</td>
</tr>
<tr>
<td></td>
<td>500 µL</td>
<td>±1.5</td>
<td>±7.5</td>
</tr>
<tr>
<td></td>
<td>1 000 µL</td>
<td>±0.8</td>
<td>±8.0</td>
</tr>
</tbody>
</table>
13.8.2 Dispensing

<table>
<thead>
<tr>
<th>Dispensing tool</th>
<th>Volume range Dispensing</th>
<th>Testing volume</th>
<th>Error limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Systematic error</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>± %</td>
</tr>
<tr>
<td>TS 50</td>
<td>1.0 µL – 50 µL</td>
<td>5 µL</td>
<td>±5.0</td>
</tr>
<tr>
<td>TS 300</td>
<td>20 µL – 300 µL</td>
<td>30 µL</td>
<td>±3.0</td>
</tr>
<tr>
<td>TS 1000</td>
<td>40 µL – 1 000 µL</td>
<td>100 µL</td>
<td>±2.0</td>
</tr>
<tr>
<td>TS 50-8</td>
<td>1.0 µL – 50 µL</td>
<td>5 µL</td>
<td>±7.5</td>
</tr>
<tr>
<td>TS 300-8</td>
<td>20 µL – 300 µL</td>
<td>30 µL</td>
<td>±5.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150 µL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>300 µL</td>
<td></td>
</tr>
<tr>
<td>TS 1000-8</td>
<td>40 µL – 1 000 µL</td>
<td>100 µL</td>
<td>±1.0</td>
</tr>
</tbody>
</table>

13.9 Test conditions for dispensing tool errors

Test conditions and test evaluation in accordance with ISO 8655, part 6. Test with analytical balance with evaporation protection, approved by the board of weights and measures.

The errors were determined under the following conditions:

<table>
<thead>
<tr>
<th>Pipette tip</th>
<th>epT.I.P.S. Motion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid</td>
<td>Water according to ISO 3696</td>
</tr>
<tr>
<td>Number of determinations</td>
<td>10</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>20 °C – 25 °C ± 0.5 °C</td>
</tr>
<tr>
<td>Liquid dispensing</td>
<td>Free-jet dispensing</td>
</tr>
</tbody>
</table>
## 14 Ordering Information

### 14.1 Tools

<table>
<thead>
<tr>
<th>Order no. (International)</th>
<th>Description</th>
</tr>
</thead>
</table>
| 5280 000.010             | Single-channel dispensing tool TS 50  
Volume range 1 µL - 50 µl |
| 5280 000.037             | Single-channel dispensing tool TS 300  
Volume range 20 µ - 300 µl |
| 5280 000.053             | Single-channel dispensing tool TS 1000  
Volume range 40 µl - 1000 µl |
| 5280 000.215             | Eight-channel-dispensing tool TM 50  
Volume range 1 µL - 50 µl |
| 5280 000.231             | Eight-channel-dispensing tool TM 300  
Volume range 20 µ - 300 µl |
| 5280 000.258             | Eight-channel-dispensing tool TM 1000  
Volume range 40 µL - 1000 µl |
| 5075 774.003             | Holder for 6 dispensing tools |

### 14.2 epT.I.P.S. Motion

<table>
<thead>
<tr>
<th>Order no. (International)</th>
<th>Description</th>
</tr>
</thead>
</table>
| 0030 014.405              | epT.I.P.S. Motion 50 µL  
10 racks with 96 tips each  
Eppendorf Quality  
Sterile |
| 0030 015.207              |             |
| 0030 014.448              | epT.I.P.S. Motion 300 µL  
10 racks with 96 tips each  
Eppendorf Quality  
Sterile |
| 0030 015.223              |             |
| 0030 014.480              | epT.I.P.S. Motion 1 000 µL  
10 racks with 96 tips each  
Eppendorf Quality  
Sterile |
| 0030 015.240              |             |
| 0030 014.413              | epT.I.P.S. Motion Filter 50 µL  
10 racks with 96 tips each  
PCR clean  
PCR clean and Sterile |
| 0030 015.215              |             |
| 0030 014.456              | epT.I.P.S. Motion Filter 300 µL  
10 racks with 96 tips each  
PCR clean  
PCR clean and Sterile |
<p>| 0030 015.231              |             |</p>
<table>
<thead>
<tr>
<th>Order no. (International)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0030 014.499</td>
<td>epT.I.P.S. Motion Filter 1 000 µL</td>
</tr>
<tr>
<td></td>
<td>10 racks with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>PCR clean</td>
</tr>
<tr>
<td>0030 015.258</td>
<td>epT.I.P.S. Motion Filter 1 000 µL</td>
</tr>
<tr>
<td></td>
<td>10 racks with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>PCR clean and Sterile</td>
</tr>
<tr>
<td>0030 014.421</td>
<td>epT.I.P.S. Motion Reloads 50 µL</td>
</tr>
<tr>
<td></td>
<td>12 × 2 trays with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>Eppendorf Quality</td>
</tr>
<tr>
<td>0030 014.464</td>
<td>epT.I.P.S. Motion Reloads 300 µL</td>
</tr>
<tr>
<td></td>
<td>12 × 2 trays with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>Eppendorf Quality</td>
</tr>
<tr>
<td>0030 014.502</td>
<td>epT.I.P.S. Motion Reloads 1 000 µL</td>
</tr>
<tr>
<td></td>
<td>12 × 2 trays with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>Eppendorf Quality</td>
</tr>
<tr>
<td>0030 014.430</td>
<td>epT.I.P.S. Motion Filter Reloads 50 µL</td>
</tr>
<tr>
<td></td>
<td>12 × 2 trays with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>PCR clean</td>
</tr>
<tr>
<td>0030 014.472</td>
<td>epT.I.P.S. Motion Filter Reloads 300 µL</td>
</tr>
<tr>
<td></td>
<td>12 × 2 trays with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>PCR clean</td>
</tr>
<tr>
<td>0030 014.510</td>
<td>epT.I.P.S. Motion Filter Reloads 1 000 µL</td>
</tr>
<tr>
<td></td>
<td>12 × 2 trays with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>PCR clean</td>
</tr>
<tr>
<td>0075 751.399</td>
<td>TipHolder</td>
</tr>
<tr>
<td></td>
<td>for epT.I.P.S. Motion Reloads</td>
</tr>
<tr>
<td>0030 014.600</td>
<td>epT.I.P.S. Motion 50 µL</td>
</tr>
<tr>
<td></td>
<td>10 SafeRacks with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>Eppendorf Quality</td>
</tr>
<tr>
<td>0030 014.642</td>
<td>epT.I.P.S. Motion 1000 µL</td>
</tr>
<tr>
<td></td>
<td>10 SafeRacks with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>Eppendorf Quality</td>
</tr>
<tr>
<td>0030 014.618</td>
<td>epT.I.P.S. Motion Filter 50 µL</td>
</tr>
<tr>
<td></td>
<td>10 SafeRacks with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>PCR clean</td>
</tr>
<tr>
<td>0030 014.650</td>
<td>epT.I.P.S. Motion Filter 1 000 µL</td>
</tr>
<tr>
<td></td>
<td>10 SafeRacks with 96 tips each</td>
</tr>
<tr>
<td></td>
<td>PCR clean</td>
</tr>
</tbody>
</table>
### 14.3 Plates

All twin.tec plates can be obtained with bar coding on request. Information on other types of plates can be found in our catalog and on the webpage [www.eppendorf.com](http://www.eppendorf.com).

<table>
<thead>
<tr>
<th>Order no. (International)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>twin.tec PCR Plate 96, skirted</strong></td>
</tr>
<tr>
<td>0030 128.648</td>
<td>low profile, wells colorless, 25 pieces</td>
</tr>
<tr>
<td></td>
<td>border clear</td>
</tr>
<tr>
<td>0030 128.656</td>
<td>border yellow</td>
</tr>
<tr>
<td>0030 128.664</td>
<td>border green</td>
</tr>
<tr>
<td>0030 128.672</td>
<td>border blue</td>
</tr>
<tr>
<td>0030 128.680</td>
<td>border red</td>
</tr>
<tr>
<td></td>
<td><strong>twin.tec PCR Plate 96, skirted</strong></td>
</tr>
<tr>
<td>0030 128.800</td>
<td>Wells black, 25 pieces</td>
</tr>
<tr>
<td></td>
<td>border yellow</td>
</tr>
<tr>
<td></td>
<td><strong>twin.tec PCR Plate 384</strong></td>
</tr>
<tr>
<td>0030 128.508</td>
<td>Wells colorless, 25 pieces</td>
</tr>
<tr>
<td>0030 128.516</td>
<td>border clear</td>
</tr>
<tr>
<td>0030 128.524</td>
<td>border yellow</td>
</tr>
<tr>
<td>0030 128.532</td>
<td>border green</td>
</tr>
<tr>
<td>0030 128.540</td>
<td>border red</td>
</tr>
<tr>
<td></td>
<td><strong>PCR-Cooler</strong></td>
</tr>
<tr>
<td>3881 000.015</td>
<td>Starter Set (1 x pink, 1 x blue)</td>
</tr>
<tr>
<td>3881 000.023</td>
<td>pink</td>
</tr>
<tr>
<td>3881 000.031</td>
<td>blue</td>
</tr>
</tbody>
</table>

### 14.4 Reservoirs

<table>
<thead>
<tr>
<th>Order no. (International)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>epMotion Reservoir</strong></td>
</tr>
<tr>
<td>0030 126.505</td>
<td>PCR clean, 10 x 5 pieces in bags</td>
</tr>
<tr>
<td>0030 126.513</td>
<td>30 mL</td>
</tr>
<tr>
<td></td>
<td>100 mL</td>
</tr>
<tr>
<td></td>
<td><strong>Reservoir 400 mL</strong></td>
</tr>
<tr>
<td>5075 751.364</td>
<td>10 pieces</td>
</tr>
</tbody>
</table>
# 14.5 Racks

<table>
<thead>
<tr>
<th>Order no. (International)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Racks for individual tubes</strong> for use with Eppendorf vessels and glass or plastic test tubes, cannot be tempered</td>
</tr>
<tr>
<td>5075 761.009</td>
<td>Ø 17 mm x 100 mm max. length</td>
</tr>
<tr>
<td>5075 775.000</td>
<td>Ø 17 mm x 60 mm max. length</td>
</tr>
<tr>
<td>5075 760.002</td>
<td>Ø 16 mm x 100 mm max. length</td>
</tr>
<tr>
<td>5075 776.006</td>
<td>Ø 16 mm x 60 mm max. length</td>
</tr>
<tr>
<td>5075 792.028</td>
<td>Ø 15 mm x 100 mm max. length</td>
</tr>
<tr>
<td>5075 792.044</td>
<td>Ø 15 mm x 60 mm max. length</td>
</tr>
<tr>
<td>5075 792.001</td>
<td>Ø 14 mm x 100 mm max. length</td>
</tr>
<tr>
<td>5075 792.060</td>
<td>Ø 14 mm x 60 mm max. length</td>
</tr>
<tr>
<td>5075 762.005</td>
<td>Ø 13 mm x 100 mm max. length</td>
</tr>
<tr>
<td>5075 792.087</td>
<td>Ø 13 mm x 60 mm max. length</td>
</tr>
<tr>
<td>5075 763.001</td>
<td>Ø 12 mm x 100 mm max. length</td>
</tr>
<tr>
<td>5075 792.109</td>
<td>Ø 12 mm x 60 mm max. length</td>
</tr>
<tr>
<td></td>
<td><strong>Rack</strong> for 24 HPLC vessels</td>
</tr>
<tr>
<td>5075 792.125</td>
<td>Ø 12 mm x 40 mm max. length</td>
</tr>
<tr>
<td></td>
<td><strong>Rack</strong> for 96 x 1.5/2.0 mL conical tubes</td>
</tr>
<tr>
<td>5075 791.005</td>
<td><strong>Thermorack TMX</strong> for 24 Safe-Lock tubes</td>
</tr>
<tr>
<td>5075 751.160</td>
<td>0.5 mL</td>
</tr>
<tr>
<td>5075 751.186</td>
<td>1.5 mL/2.0 mL</td>
</tr>
<tr>
<td></td>
<td><strong>Thermorack</strong> for 24 Safe-Lock tubes</td>
</tr>
<tr>
<td>5075 769.000</td>
<td>0.5 mL</td>
</tr>
<tr>
<td>5075 771.004</td>
<td>1.5/2.0 mL</td>
</tr>
<tr>
<td></td>
<td><strong>Adapter sleeves</strong> for thermorack 1.5/2.0 mL</td>
</tr>
<tr>
<td>5075 772.000</td>
<td>for 0.5 mL Safe-Lock tubes</td>
</tr>
<tr>
<td></td>
<td><strong>ReservoirRack Module TC</strong></td>
</tr>
<tr>
<td>5075 799.049</td>
<td>PCR 0.2 mL</td>
</tr>
<tr>
<td>5075 799.065</td>
<td>PCR 0.5 mL</td>
</tr>
<tr>
<td>5075 799.081</td>
<td>Safe-Lock 1.5 mL/2 mL</td>
</tr>
<tr>
<td>5075 799.103</td>
<td>Ø 12 mm</td>
</tr>
<tr>
<td>5075 799.120</td>
<td>Ø 16 mm</td>
</tr>
<tr>
<td>5075 799.162</td>
<td>Ø 17 mm</td>
</tr>
<tr>
<td>5075 799.189</td>
<td>Ø 29 mm</td>
</tr>
<tr>
<td>5075 799.146</td>
<td>Reservoir 30 mL</td>
</tr>
<tr>
<td>5075 799.260</td>
<td>Reservoir 100 mL</td>
</tr>
<tr>
<td>5075 799.340</td>
<td>Eppendorf Tubes 5.0 mL</td>
</tr>
<tr>
<td>5075 790.009</td>
<td><strong>Rack Smart</strong></td>
</tr>
</tbody>
</table>
### 14.6 Adapters

<table>
<thead>
<tr>
<th>Order no. (International)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5075 795.000</td>
<td>Rack LC</td>
</tr>
<tr>
<td>5075 767.031</td>
<td>Thermorack CB</td>
</tr>
<tr>
<td>5075 754.002</td>
<td>Reservoir Rack</td>
</tr>
<tr>
<td></td>
<td>for 30 mL and 100 mL reservoirs and Reservoir Rack Module TC</td>
</tr>
<tr>
<td>5075 751.453</td>
<td>Rack</td>
</tr>
<tr>
<td></td>
<td>for 24 Safe-Lock tubes</td>
</tr>
<tr>
<td>5075 751.275</td>
<td>Rack</td>
</tr>
<tr>
<td></td>
<td>for 0.5 mL/1.5 mL/2.0 mL, cannot be tempered, with adapter sleeves for 0.5 mL</td>
</tr>
<tr>
<td>5075 755.009</td>
<td>Rack</td>
</tr>
<tr>
<td></td>
<td>for 1.5 mL/2.0 mL, cannot be tempered</td>
</tr>
</tbody>
</table>

### 14.7 Thermoblocks

<table>
<thead>
<tr>
<th>Order no. (International)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5075 766.000</td>
<td>Thermoblock</td>
</tr>
<tr>
<td></td>
<td>PCR 96</td>
</tr>
<tr>
<td></td>
<td>for use with vessels 0.2 mL or 77 PCR tubes 0.5 mL</td>
</tr>
<tr>
<td>5075 767.007</td>
<td>Thermoblock</td>
</tr>
<tr>
<td></td>
<td>PCR 384</td>
</tr>
</tbody>
</table>
14.8 Accessories

Worktable base adapters may only be mounted by authorized service technicians.

<table>
<thead>
<tr>
<th>Order no. (International)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5075 753.006</td>
<td>Waste box</td>
</tr>
<tr>
<td>5075 751.500</td>
<td>LiquidWasteTub to hinge in the waste box. autoclavable</td>
</tr>
<tr>
<td>5070 752.001</td>
<td>Worktable base adapter to raise the epMotion worktable</td>
</tr>
<tr>
<td></td>
<td>4 pieces</td>
</tr>
</tbody>
</table>
Index

A
Accessories
   Ordering information ........................................... 94
Adapters
   Ordering information ............................................ 93
Application
   Aborting ............................................................. 69
   Checking the labware ......................................... 79
   Continue .................................................................. 68
   Control .................................................................... 67
   Pause ...................................................................... 68
   Start ...................................................................... 67
   Stop ...................................................................... 68
Aspirating liquid .......................................................... 30
   From bottom of vessel ......................................... 34
   High vessels .......................................................... 35
Autoclaving ................................................................. 71

B
Bottom tolerance ............................................................ 30

C
Carrier
   Technical data .......................................................... 86

D
Dispensing
   Volume check .......................................................... 75
Dispensing error ............................................................ 81
Dispensing liquid
   At height of the edge of the vessel ......................... 36
Dispensing mode:
   Multidispense .......................................................... 32
   Pipette .................................................................... 32
Dispensing tool
   Decontamination and cleaning .................................. 71
Dispensing error ............................................................ 81
Exchanging the sealing rings ....................................... 76
Placement ..................................................................... 64
Disposal ........................................................................ 84
DNA ........................................................................... 8
DWP ............................................................................. 8

E
EasyCon
   Dekontamination and cleaning .................................. 71
   Interfaces .................................................................. 16
   Technical data .......................................................... 86
epT.I.P.S. Motion .......................................................... 41, 64
   Multiple use ............................................................ 45
   Ordering information ............................................... 89
   Reload ..................................................................... 41
   SafeRack ................................................................. 41
Error message
   Dispensing error ..................................................... 81
   Optical sensor read error ......................................... 80
   Software error ......................................................... 81
Error search ................................................................. 79

F
firmware
   Update ..................................................................... 75

L
Labware
   Adapters ................................................................. 54
   Bottom tolerance ..................................................... 30
   Decontamination and cleaning .................................. 71
   Dispensing tool .......................................................... 27
   epT.I.P.S. Motion ..................................................... 41
   Height adapter .......................................................... 54
   Liquid WasteTub ....................................................... 59
   Plates ...................................................................... 38
   Racks ..................................................................... 47
   Reservoir Rack .......................................................... 50
   Reservoir Rack modules ........................................... 51
   Reservoirs ................................................................. 40
   Thermoadapter .......................................................... 55
   Thermoblocks ............................................................ 57
   Thermoracks ............................................................. 49
   Tip Holder ................................................................. 44
   Tools ....................................................................... 27
   Tubes ...................................................................... 37
   Waste container .......................................................... 58
Liquid Waste Tub
   Placement .................................................................. 65
Liquid WasteTub ........................................................... 59
Location
   Connections ............................................................. 23
   Requirements ........................................................... 23
Index
epMotion® 5070
English (EN)

M
MTP ................................................................. 8

N
Noise level .......................................................... 85

O
Optical sensor.......................................................... 26
Read error .......................................................... 80
Technical data .................................................. 86

Ordering information
Accessories ...................................................... 94
Adapters .......................................................... 93
epT.I.P.S. Motion .............................................. 89
Plates ..................................................................... 91
Racks ..................................................................... 92
Reservoirs .......................................................... 91
Thermoblock .................................................... 93
Tools ................................................................. 89

P
PCR .......................................................................... 8
PDF .......................................................................... 8
Pipette tips ............................................................ 41
  Multiple use ........................................................ 45
Pipetting ................................................................. 32
Plates
  Ordering information ........................................ 91
Power off .............................................................. 70

R
Racks
  Ordering information ........................................ 92
Remaining volume................................................. 30
Reservoirs
  Ordering information ........................................ 91

S
Safety devices.......................................................... 22
Service
Dispensing tool.................................................. 76
Dispensing tool sealing rings.......................... 76
Storage................................................................. 83

T
Technical data
  Ambient conditions ........................................... 85
  Carrier .......................................................... 86
  EasyCon ........................................................ 86
  Noise level ..................................................... 85
  Optical sensor ................................................. 86
Test run ..................................................................... 66
Thermoblock
  Ordering information ....................................... 93
Tools ..................................................................... 27
  Ordering information ........................................ 89
  Placement........................................................ 64

U
USB .......................................................................... 8

W
Wartung
  Service provisions ............................................. 74
  Service provisions ............................................. 74
Waste container ...................................................... 58
  Empty ........................................................... 69
  Placement......................................................... 65
Work surface adapter .............................................. 71
Worktable
  Cleaning up ..................................................... 69
  Decontamination and cleaning ......................... 71
  Displaying the loading ..................................... 63
  Locations ........................................................ 25
  Placement of dispensing tools ......................... 64
  Positioning the epT.I.P.S. Motion ..................... 64
  Positioning the waste container and liquid waste tube .... 65
EG-Konformitätserklärung
EC Conformity Declaration


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, epMotion® 5070f)

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 61010-2-010, EN 61010-2-051, EN 61010-2-81
2004/108/EG, EN 55011, EN 61326-1
EN ISO 8655-1/-2/-6

Vorstand, Board of Management:
09.08.2013
Hamburg, Date:

Hamburg, Date:

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