# eppendorf

# CryoCube® F740

**Operating manual**

# Table of contents

# 1 Operating instructions
## 1.1 Using this manual

▶ Read this operating manual completely before using the device for the first time. Observe the instructions for use of the accessories where applicable.

▶ This operating manual is part of the product. Please keep it in a place that is easily accessible.

▶ Enclose this operating manual when transferring the device to third parties.

▶ The current version of the operating manual for all available languages can be found on our webpage www.eppendorf.com/manuals.

## 1.2 Danger symbols and danger levels
### 1.2.1 Danger symbols

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

| | Risk of tipping over | | Electric shock |
|---|---|---|---|
| | Highly flammable substances | | Explosive substances |
| | Low temperatures | | Biohazard |
| | Heavy load | | Risk of crushing |
| | Hazard point | | Material damage |

### 1.2.2 Danger levels

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

## 1.3    Symbols us ed

| Depiction | Meaning |
|---|---|
| 1.<br>2. | Actions in the specified order |
| ▸ | Actions without a specified order |
| • | List |
| *Text* | Display or software texts |
| ❶ | Additional information |

## 1.4    Operating manual version overview

Order no. CT0540-0000-013

| Version | Date | Change |
|---|---|---|
| 00 | April 2017 | Created new |
| 01 | June 2018 | Completely revised |
| 02 | June 2018 | CryoCube F740h included |

## 2 Safety
## 2.1 Intended use

CryoCube ULT freezers are designed to provide an ultra-low temperature environment for storing scientific research materials. They allow for storage of samples at ultra-low temperatures of -50 °C to -86 °C and at a maximum ambient temperature of 32 °C.

All country-specific safety requirements for operating electrical equipment in laboratories must be observed.

## 2.2 Warnings for intended use

**DANGER! Risk of injury due to tipping of the device**
If the device tips over and falls on a person, the person may sustain fatal injuries.

▸ Transport the device with a sufficient number of helpers.
▸ Do not transport the device over ramps at an angle > 17 % (10°). Transport the device sideways over ramps.
▸ Only lift the device with a transport aid.

**WARNING! Risk of injury from climbing onto the device**
The device cannot carry the weight of a person. If the device tips over and falls on a person, this person may sustain severe injuries.
Parts of the device can break off.

▸ Do not climb onto the device.
▸ Do not pull yourself up on the device or the outer door.

**WARNING! Damage to health due to infectious liquids and pathogenic germs.**

▸ When handling infectious liquids and pathogenic germs, observe the national regulations, the biosafety level of your laboratory, the material safety data sheets, and the manufacturer's application notes.
▸ Wear your personal protective equipment.
▸ For comprehensive regulations about handling germs or biological material of risk group II or higher, please refer to the "Laboratory Biosafety Manual" (source: World Health Organization, Laboratory Biosafety Manual, the current edition).

**WARNING! Risk of explosion**

▸ Do not operate the device in areas where work with explosive substances is carried out.
▸ Do not store explosive or highly reactive substances in this device.
▸ Do not use this device to store substances that may generate an explosive atmosphere.

**WARNING! Lethal voltages inside the device.**
If you touch any parts which are under high voltage you may experience an electric shock. Electric shocks cause injuries to the heart and respiratory paralysis.

▸ Ensure that the housing is closed and undamaged.
▸ Do not remove the housing.
▸ Ensure that no liquids can penetrate the device.
Only authorized service staff may open the device.

**WARNING! Danger due to electric shock**
A damaged or unsuitable mains/power cord can cause an electric shock.

▸ If the supplied mains/power cord is defective, replace it with a mains/power cord and a plug of the same type.

**CAUTION! Risk of burns from direct contact with cold surfaces.**
The temperature inside the device is low. Direct contact with the interior or samples can cause skin burns.

▸ Wear cold protection gloves when loading and unloading the device.

### 2.2.1 Devices with flammable refrigerant

CryoCube F740h

**WARNING! Risk of fire due to escaping flammable refrigerants (R-170 and R-290)**
Refrigerant may leak out if a refrigeration cycle is faulty. The refrigerants R-170 and R-290 are flammable and can form explosive mixtures with the ambient air.

▸ Ensure adequate ventilation of the location.
▸ Observe the regulations of the owner.
▸ Do not allow the device to be maintained or repaired by anyone except authorized service technicians. Components may only be replaced with original spare parts of the same type.

## 2.3 User profile

The device and accessories may only be operated by trained and skilled personnel.

Before using the device, read the operating manual carefully and familiarize yourself with the device's mode of operation.

## 2.4 Personal protective equipment

Personal protective equipment protects your life and your health.

▸ Always wear protective clothing, protective gloves, and safety boots.
▸ If additional protective equipment is required, this is indicated above the respective instruction.
▸ Always wear the personal protective equipment required for the biosafety level and by the laboratory regulations.

## 2.5 Information on product liability

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

- 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 that are not recommended by Eppendorf.
- The device is maintained or repaired by persons not authorized by Eppendorf AG.
- The user makes unauthorized changes to the device.

## 2.6 Maintenance and repairs

Eppendorf AG holds training sessions for service technicians. The service technicians learn how to service and repair the device. After completing the training the service technicians receive a certificate and are authorized by Eppendorf.

▸ Do not allow the device to be maintained by anyone except service technicians who are authorized by Eppendorf AG.
  For more information, please contact your Eppendorf partner or visit www.eppendorf.com.

▸ Do not allow the device to be maintained by anyone except service technicians who are accredited according to the national and local laws and safety regulations. Service technicians must hold valid certificates.

Australia, Queensland: the legal regulations state that service technicians require a valid gas work license for working on the refrigeration cycle.

Eppendorf AG uses high-quality components for the device which are manufactured especially for this purpose. These components ensure the safe function of the device. Eppendorf AG provides original spare parts for the service and repair of the device.

▸ Components may only be replaced by original spare parts of the same type.

## 2.7 Electromagnetic compatibility
### 2.7.1 Europe

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

### 2.7.2 U.S.A.

Any modification or changes made to this device, unless explicitly approved by Eppendorf, will invalidate the authorization of this device. Operation of an unauthorized device is prohibited under Section 302 of the Communications Act of 1934, as amended, and Subpart I of Part 2 of Chapter 47 of the Code of Federal Regulations.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the operating manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## 2.8 Warning symbols on the device
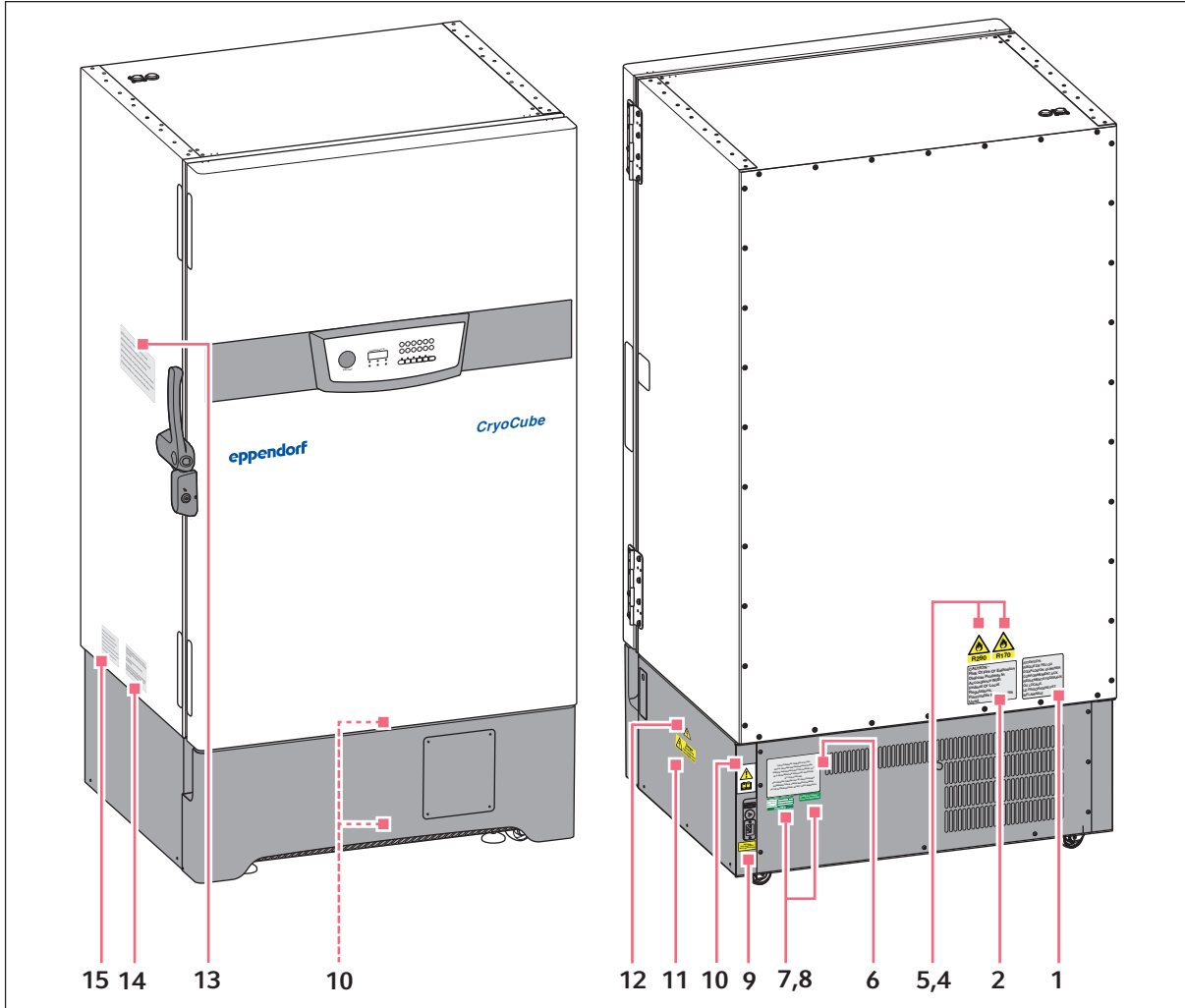


Fig. 2-1: Warning symbols on the outside

| | Warning symbol | Meaning |
|---|---|---|
| 1 | **ATTENTION-RISQUE DE FEU OU D´EXPLOSION. ELIMINER CONFORMEMENT AUX REGLEMENTS FEDERAUX OU LOCAUX. LE FRIGORIGENE EST INFLAMABLE** | Notice<br>Risk of fire or explosion. Dispose of the device in accordance with federal or local laws and regulations. The device contains flammable refrigerant. |

| | Warning symbol | Meaning |
|---|---|---|
| 2 | **CAUTION - Risk Of Fire Or Explosion Dispose Properly In Accordance With Federal Or Local Regulations. Flammable Refrigerants Used.** | Notice<br>Risk of fire or explosion. Dispose of the device in accordance with federal or local laws and regulations. The device contains flammable refrigerant. |
| 4 | **R170** | Danger from flammable refrigerant R-170. |
| 5 | **R290** | Danger from flammable refrigerant R-290. |
| 6 | THIS EPPENDORF FREEZER IS FITTED WITH A CASCADE REFRIGERATION SYSTEM. SERVICE AND REPAIRS MUST BE CARRIED OUT BY A REFRIGERATION SPECIALIST APPROVED BY YOUR SUPPLIER. ANY REPAIRS CARRIED OUT BY UNAUTHORISED ENGINEERS COULD CAUSE SERIOUS DAMAGE TO THE SYSTEM AND MAY AFFECT YOUR WARRAN1Y. | The device may only be serviced and repaired by a qualified refrigeration specialist who has been authorized by Eppendorf AG.<br>If the device is serviced or repaired by an unauthorized person, liability on the part of Eppendorf AG shall cease immediately. |
| 7 | **ELECTRICAL SAFETY TEST** DATE/INITIALS APPL/REF No. NEXT TEST DATE **PASSED** | The device has passed the electrical safety test. |
| 8 | **RoHS Compliant Directive 2002/95/EC** | The device complies with the RoHS Directive 2002/95/EC. |
| 9 | **WARNING THIS EQUIPMENT MUST BE EARTHED** | Only connect the device to a mains/power connection with PE conductor. |

| | Warning symbol | Meaning |
|---|---|---|
| 10 | | Notice of a hazard point. Read the operating manual. |
| 11 | **Danger** Disconnect the mains supply before removing this cover | Risk of electric shock. Disconnect the mains/power cord from the voltage supply before removing the cover. |
| 12 | | Electric shock |
| 13 | THIS FREEZER IS FITTED WITH A HIGH EFFICIENCY DOOR SEAL. AFTER CLOSING THE FREEZER DOOR OR LID A VACUUM CAN BE CREATED INSIDE THE CABINET. THIS IS RELEASED THROUGH A SPECIAL VENT VALVE WHICH SHOULD BE KEPT CLEAR OF ICE. (REFER TO HANDBOOK)<br><br>SHOULD THE VENT VALVE BECOME BLOCKED DO NOT TRY TO FORCE THE DOOR OR LID, WAiT, THE VACUUM WILL EVENTUALLY BE RELEASED BUT IT CAN TAKE 1 OR 2 HOURS.<br><br>DO NOT DAMAGE THE HIGH EFFICIENCY SEAL OR STRAIN THE HINGES BY ALLOWING THE ICE TO FORM ON THE DOOR SEAL. WIPE CLEAN OCCASIONALLY. | The outer door of the device is fitted with a high efficiency seal. After closing the outer door or the lid a negative pressure can be created inside the device. The negative pressure is compensated by the *auto vent* valve. Keep the *auto vent* valve free of ice. Should the *auto vent* valve be blocked, do not try to open the outer door or the lid by force. Wait until pressure compensation has taken place. Pressure compensation may take 1 – 2 hours. The formation of ice in the seal can damage the seal and hinges. To avoid damage, clean the seal to remove ice. |
| 14 | THIS DEVICE COMPLIES WITH PART15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING CONDITIONS:<br><br>(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE<br><br>(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION | The device complies with *FCC Rules Part 15*.<br><br>The device may be operated under the following conditions:<br>• This device may not cause harmful interference.<br>• This device must accept any interference received. This includes interference that may cause undesired operation. |
| 15 | [EN] Foam blown with fluorinated greenhouse gases.<br>[FR] Mousse soufflée avec des gaz à effet de serre fluorés.<br>[DE] Schaumisolation enthält fluoriertes Treibmittel.<br>[ES] Espuma fundida con gases fluorados de efecto invernadero.<br>[P1] Espuma soprada corn gases fluorados com efeito de estufa.<br>[IT] Schiuma soffiato con i gas fluorurati ad effetto serra. | Foam blown with fluorinated greenhouse gases. |

Fig. 2-2:    Warning symbols on the rear of the opened device

The warning symbols inside the device can only be accessed by authorized service technicians.

| | Warning symbol | Meaning |
|---|---|---|
| 16 | **DANGER-RISQUE DE FEU OU D´EXPLOSION. LE FRIFORIGENE EST INFLAMMABLE. CONFIER LES REPARATIONS A UN TECHNICIEN SPECIALISE. NE PAS PERFORER LA TUBULURE CONTENANT LE FRIGORIGENE.** | Danger<br>Risk of fire or explosion<br>The device contains flammable refrigerant.<br>Only qualified service technicians are allowed to repair the device.<br>Do not puncture the refrigerant tubing. |
| 17 | **DANGER - Risk Of Fire Or Explosion Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing.** | Danger<br>Risk of fire or explosion<br>The device contains flammable refrigerant.<br>Only qualified service technicians are allowed to repair the device.<br>Do not puncture the refrigerant tubing. |

| | Warning symbol | Meaning |
|---|---|---|
| 18 | | Danger due to flammable materials |
| 19 | | Danger due to flammable gas, class 2 |

# 3 Product description

## 3.1 Product overview

### 3.1.1 Front view
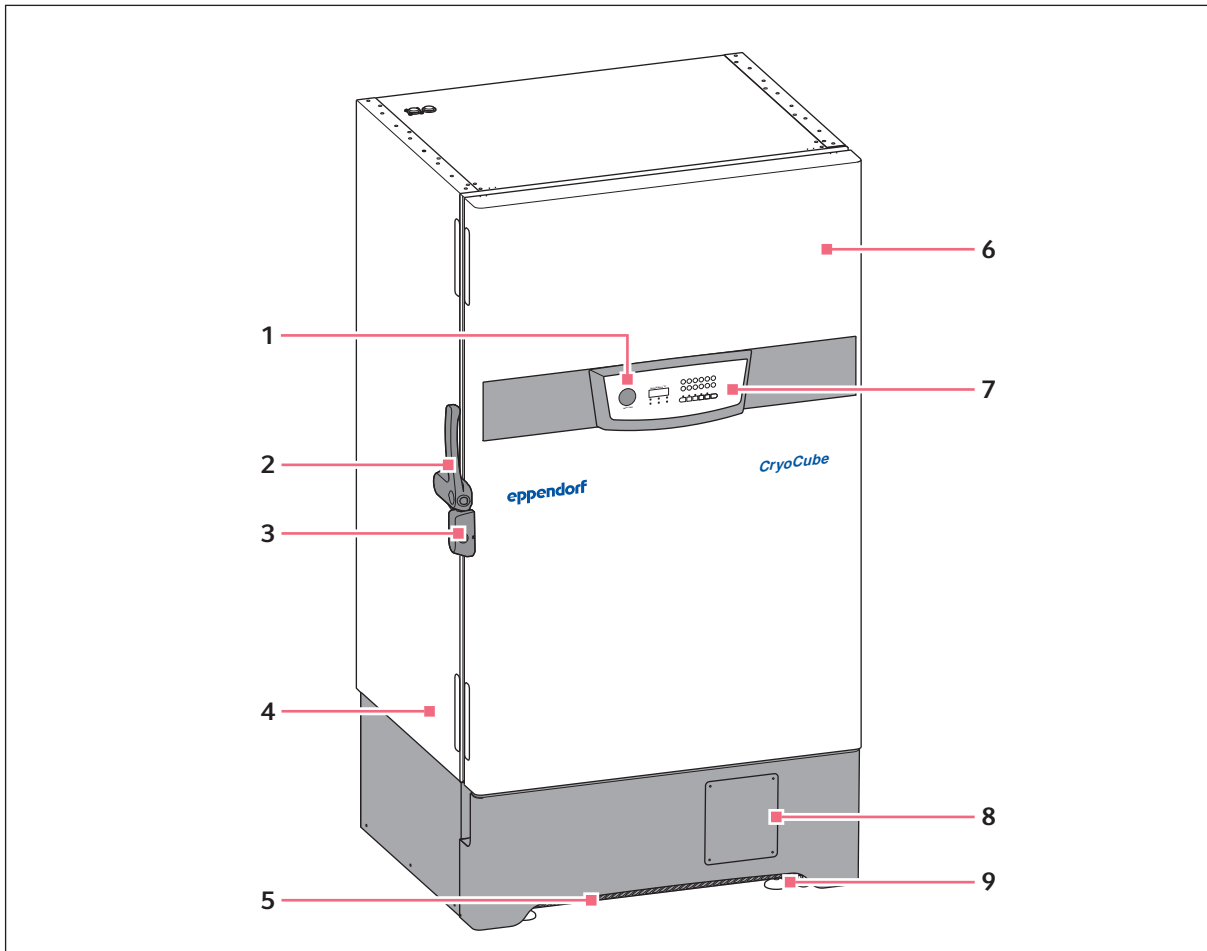


Fig. 3-1:    Front view of a model with the door handle mounted on the left side

1 *auto vent* valve
  Automatic pressure compensation

2 Door handle

3 Mechanical lock

4 Name plate

5 Air filter

6 Outer door

7 Control panel
  Display and operating controls

8 Position of the optional chart recorder

9 Leveling feet
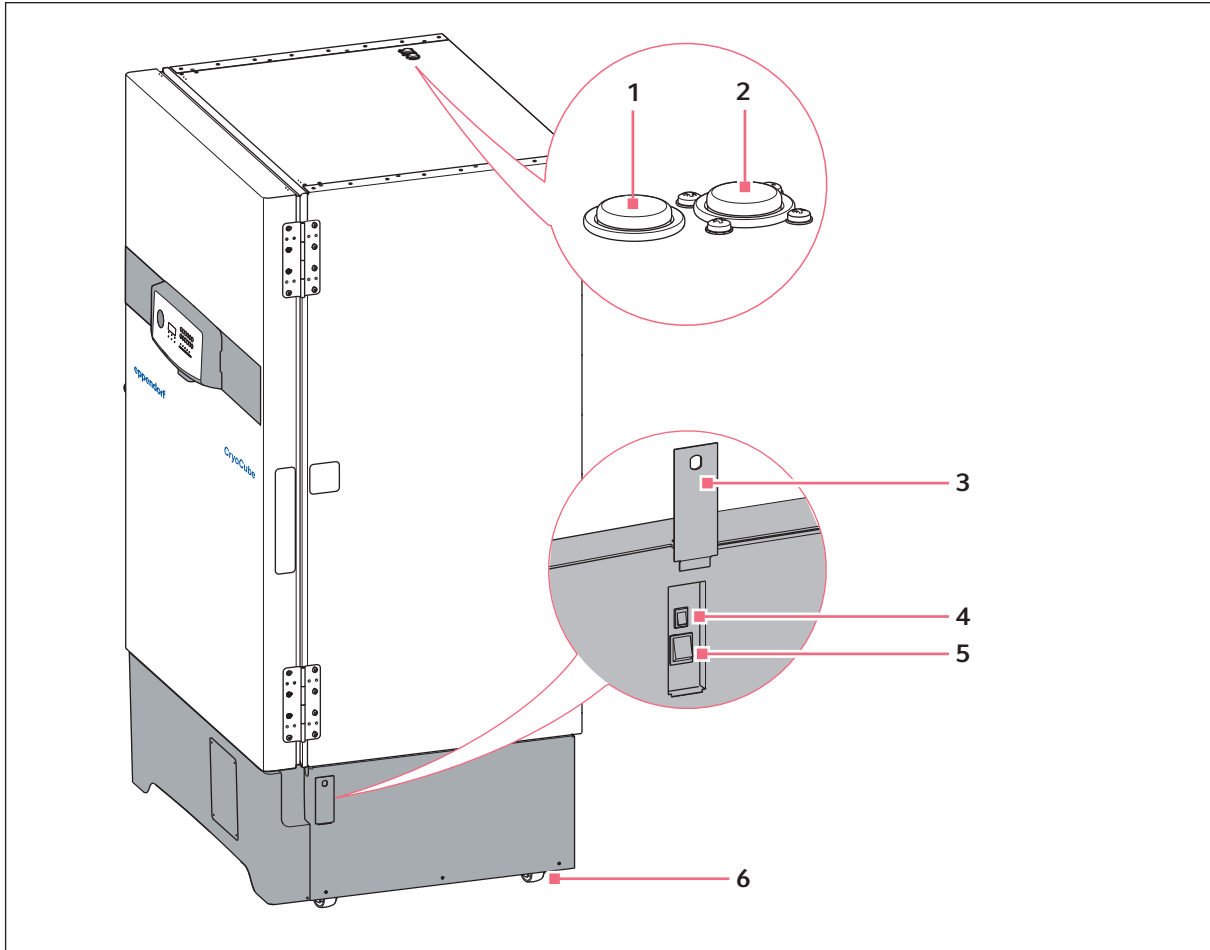
### 3.1.2 Side view



Fig. 3-2:    Side view

**1  Access port**
For external sensors

**2  Access port**
For external sensors or optional back-up system

**3  Switch locking plate**
Lockable plate cover for mains/power switch and
battery switch

**4  Battery switch**
For enabling the back-up circuit

**5  Mains/power switch**

**6  Heavy-duty castors**

### 3.1.3 Internal view
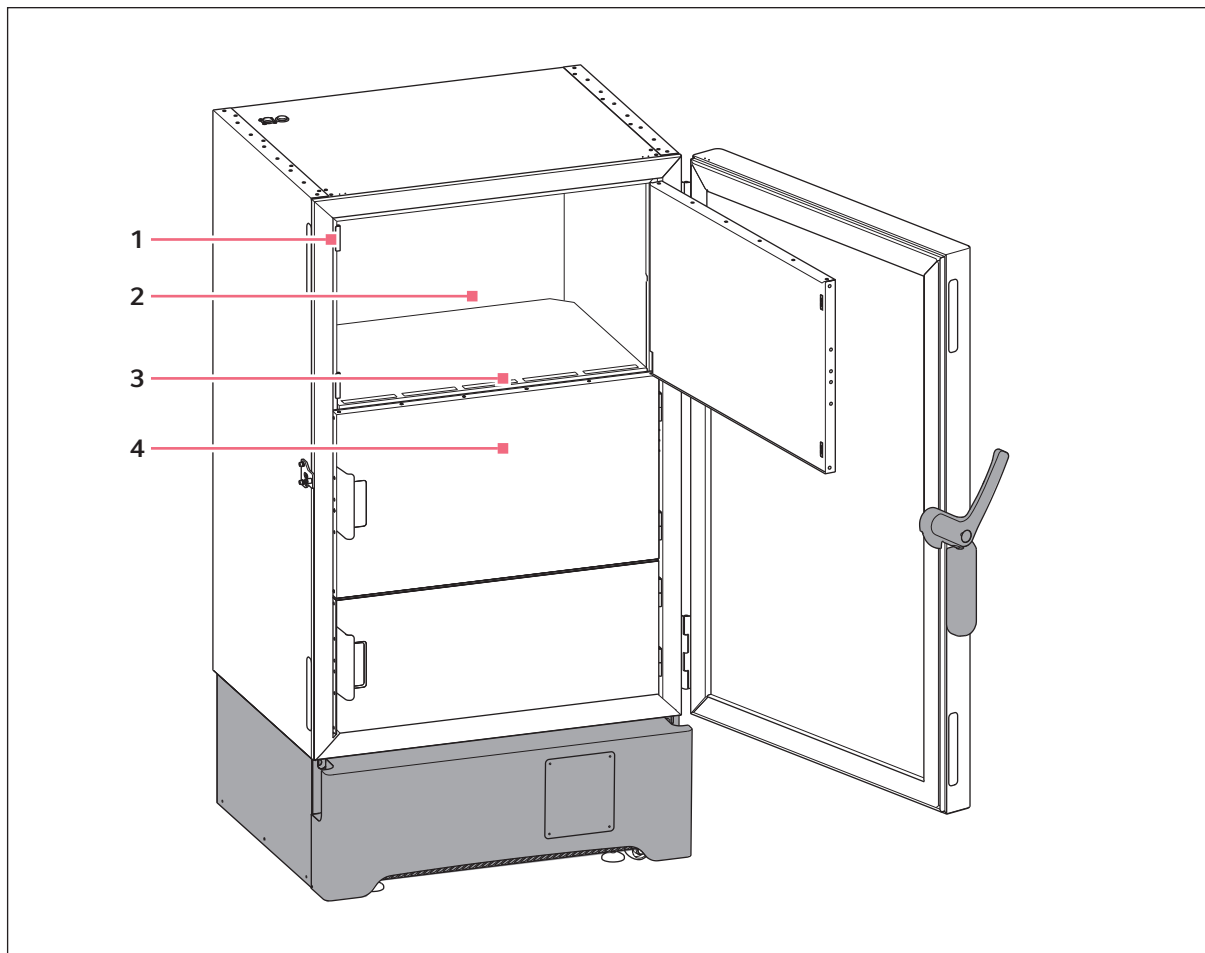


Fig. 3-3:    Internal view of a model with three inner doors

| | | | |
|---|---|---|---|
| **1** | **Magnetic closure of inner door** | **3** | **Inner shelf** |
| **2** | **Inner compartment** | **4** | **Inner door** |

### 3.1.4 Interfaces
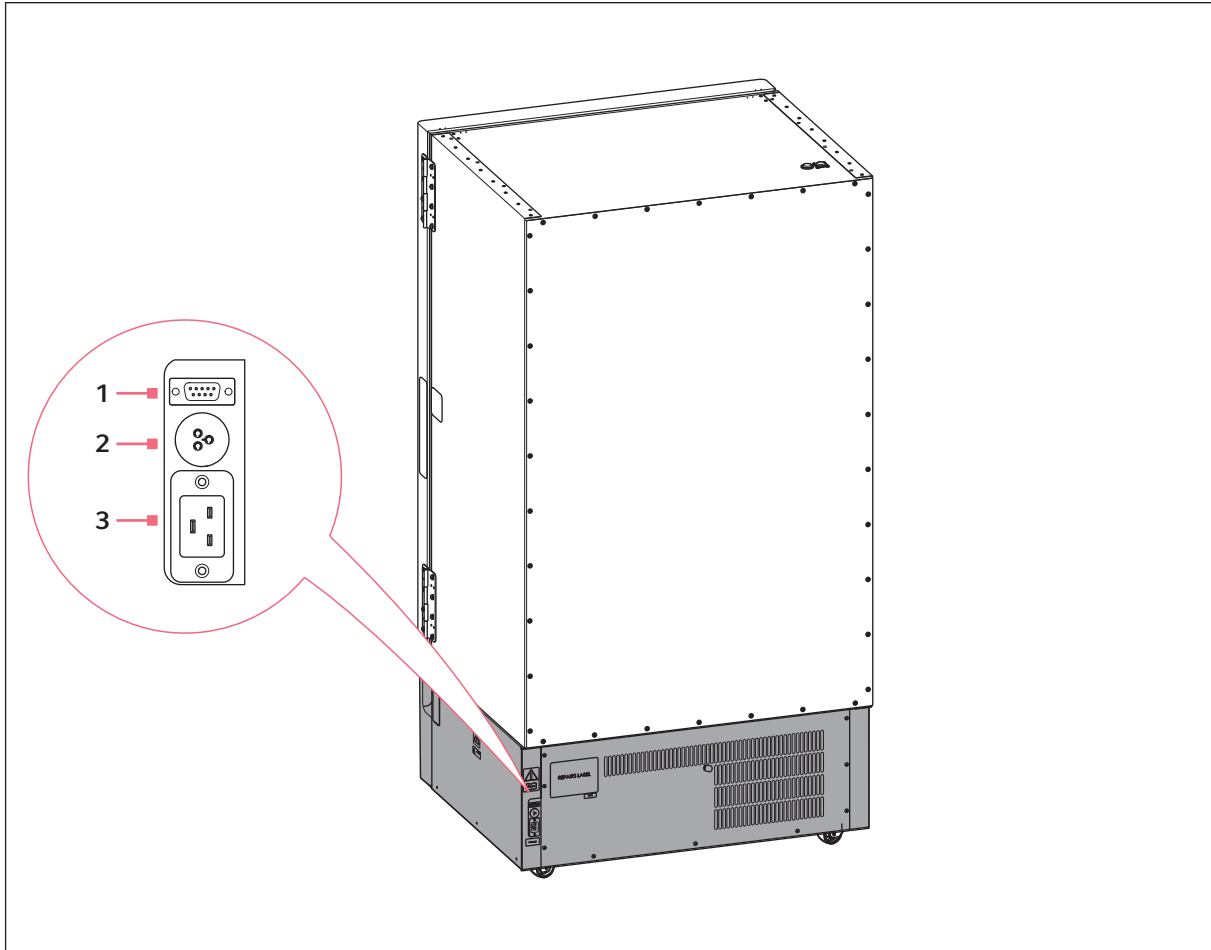


Fig. 3-4:     Rear view

**1  Serial interface**
Connection to an external system

**2  Remote alarm interface**
Connection to a building management system

**3  Mains/power connection**
Port for mains/power cord

Only connect devices that comply with the IEC 60950 (UL 60590) standards to the interfaces.

## 3.2      Features

The CryoCube is a ULT freezer for storing biological samples.

The device has a two-stage cascade refrigeration system with two closed refrigeration cycles. The refrigeration cycles are air-cooled.

The device is operated using the control panel. The control panel consists of a display, softkeys and indicator lights.

The device communicates with external systems via the interfaces. Alarms and other parameters are transmitted.

The outer door is locked and unlocked manually.

The device features automatic pressure compensation. Automatic pressure compensation takes place as soon as the outer door is closed. Afterwards, the outer door can be opened again. Pressure compensation can also be triggered with the *auto vent* valve.

Each compartment is equipped with an inner door with a seal. With the inner doors closed, cold air loss is minimized and ice formation inside the device is reduced.

The devices are equipped with 2 or 4 inner shelves. The number and position of the inner shelves cannot be changed.

The device is equipped with a switch locking plate. The mains/power switch and the battery switch are located behind the lockable cover.

An air filter is located below the outer door. The air filter protects the condenser and the components behind it against contamination and dirt.

The heavy-duty castors serve to transport the device safely to its place of installation. Leveling feet ensure the stability and horizontal alignment of the device.

## 3.3      Models

| Name | Door handle | Number of compartments | Cooling |
|------|-------------|------------------------|---------|
| CryoCube F740 CryoCube F740h | Left | 3 | Air cooling |
| CryoCube F740 CryoCube F740h | Left | 5 | Air cooling |
| CryoCube F740 CryoCube F740h | Right | 3 | Air cooling |
| CryoCube F740 CryoCube F740h | Right | 5 | Air cooling |

## 3.4     Alarms

When a safety-relevant situation has been reached, the device triggers an alarm. The user must immediately eliminate the cause of the alarm.

Alarms consist of a signal tone on site, an indicator light on the control panel, an alarm message on the control panel and forwarding of the alarm to an external monitoring system and a building management system. As soon as the cause of the alarm has been eliminated, all alarm signals will stop.

Hazard messages can be configured (see *Setting alarm limits on p. 44)*, (see *Setting an alarm delay time on p. 45)*.

**Alarm: Temperature in the interior**
  • The temperature in the interior exceeds the alarm limit for the maximum or minimum temperature in the interior.
  • The alarm is triggered after the delay time has elapsed. The delay time can be defined.
  • The signal tone sounds on the device.
  • The **temp alarm** indicator light glows.
  • The alarm is forwarded to an external monitoring system and to a building management system.
  • The alarm cannot be deactivated.

**Alarm: Mains/power outage**
  • The mains/power supply to the device is interrupted. The battery back-up circuit is switched on and triggers the alarm.
  • The signal tone sounds on the device.
  • The **power fail** indicator light glows.
  • The display shows the interior temperature and flashes at intervals of 10 s.
  • The alarm is forwarded to an external monitoring system and to a building management system.
  • The alarm cannot be deactivated.

**Alarm: Battery**
  • The battery voltage is too low.
  • The **battery-low** indicator light glows.
  • The alarm cannot be deactivated.

**Alarm: System error**
  • The signal tone sounds on the device.
  • The **fault** indicator light glows.
  • The alarm cannot be deactivated.

**Alarm: Cleaning the air filter**
  • The servicing date for the air filter has been reached. The air filter has to be cleaned.
  • The **filter-clean** indicator light flashes.
  • The alarm cannot be deactivated.

## 3.5 Delivery package
### 3.5.1 Device and accessories

| Quantity | Description |
| --- | --- |
| 1 | ULT upright freezer |
| 1 or 2 | Mains/power cord (number country-specific) |
| 1 | Safety clamp for mains/power cord |
| 2 | Key for switch locking plate |
| 2 | Key for outer door |
| 2 | Anti-slipping pads |
| 1 | Plug for connection to the building management system |
| 1 | Allen key |

### 3.5.2 Documentation

| Quantity | Description |
| --- | --- |
| 1 | Operating manual |
| 1 | Unpacking instructions |
| 1 | Certificate of conformity |

## 3.6 Accessories

Optional accessories can be ordered separately. Information regarding accessories is available on our website: www.eppendorf.com.

### 3.6.1 Back-up systems

In the event of a mains/power outage, the battery-powered back-up system will start and cool the interior for a limited period of time. The back-up system is connected through the access port.

The following back-up systems are available:
- $CO_2$ back-up system for temperatures from -60 °C to -70 °C.
- $LN_2$ back-up system for temperatures down to -85 °C.

### 3.6.2 Chart recorder

The chart recorder records the interior temperature on a disk over a period of 7 days. The port for connection of the chart recorder is available in the device.

Pens and disks for chart recorders are available.

### 3.6.3    Racks
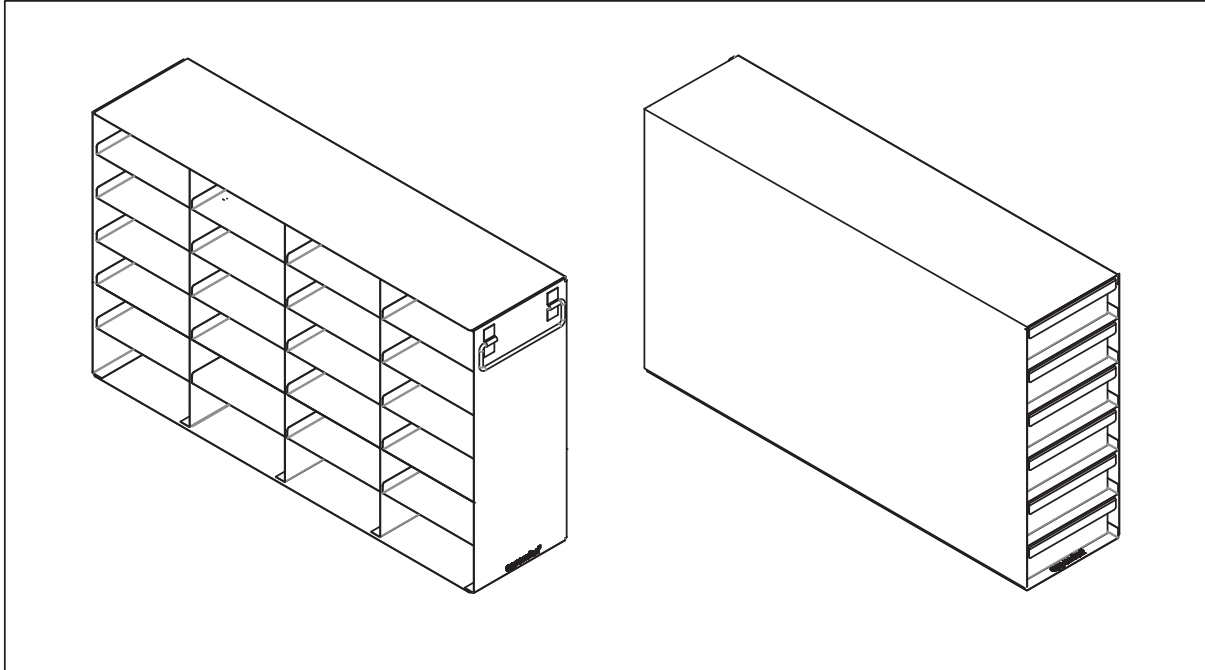


Fig. 3-5:    Rack with open sides, rack with drawers

Racks serve to store and sort samples in boxes, microplates and deepwell plates.

Racks are placed on the inner shelves inside the device. The racks are used to store boxes. Stainless steel racks provide space for 136 mm × 136 mm boxes. Aluminum racks can be used to store boxes up to 133 mm × 133 mm.

Racks are available with drawers or with open sides. The design of the racks ensures an even temperature in the entire rack.

### 3.6.4 Cardboard boxes and box dividers
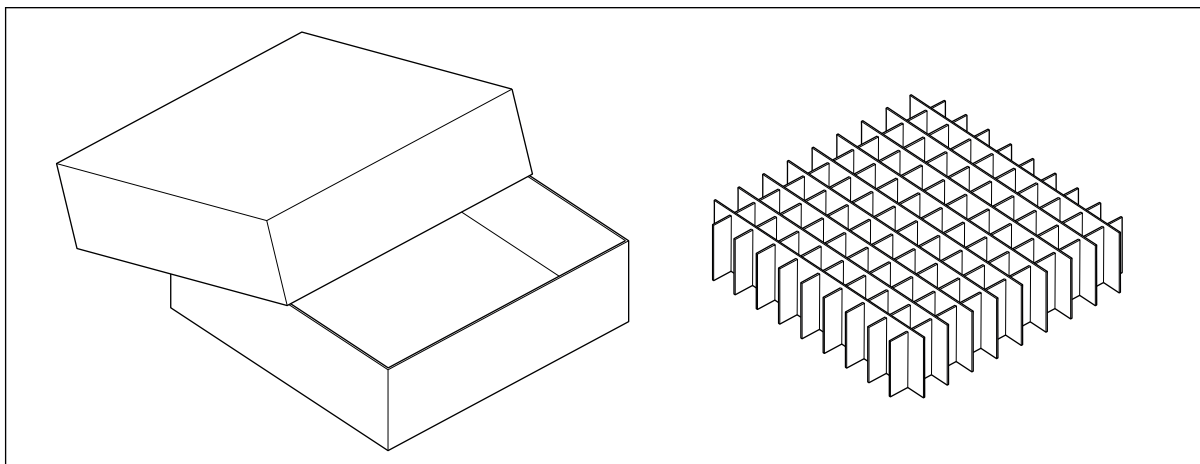


Fig. 3-6: Cardboard box and box divider

Cardboard boxes serve to store samples in tubes at temperatures down to -86 °C. Cardboard boxes have a waterproof coating.

To sort your samples, you can insert box dividers into the cardboard boxes. Eppendorf AG cardboard boxes and box dividers are compatible with each other.

### 3.6.5 Eppendorf Storage Box
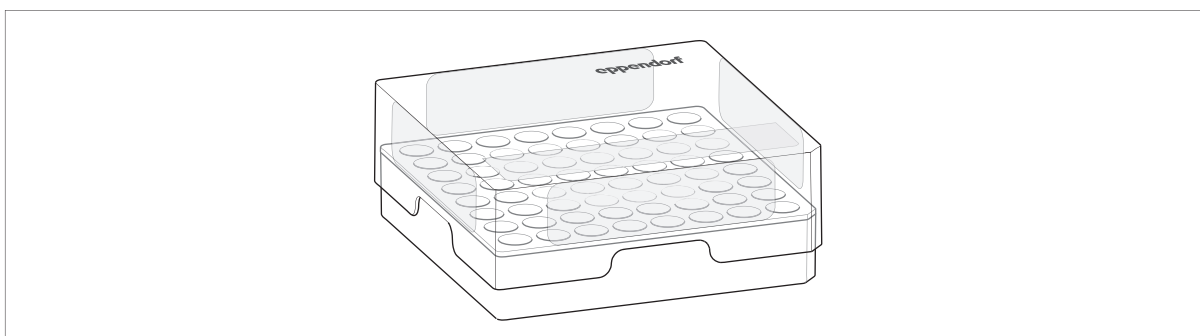


Fig. 3-7: Eppendorf Storage Box

Eppendorf Storage Boxes serve to store samples in tubes at temperatures down to -86 °C.

Eppendorf Storage Boxes are made of polypropylene (PP) and are autoclavable.

# 4 Installation
## 4.1 Selecting the location
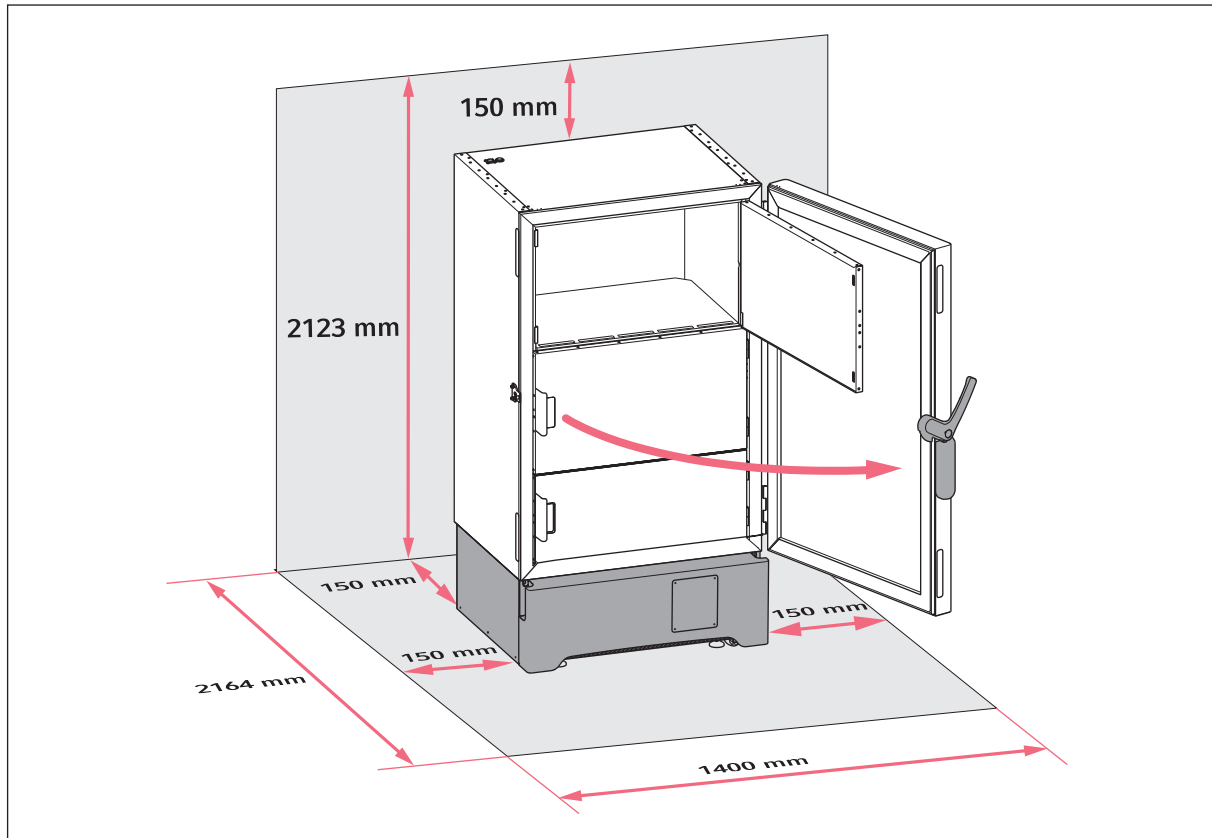


Fig. 4-1: Footprint

Information on ambient conditions, dimensions and weights can be found in the technical data.

**Location in general**
- The ambient conditions match the specifications set out in the Technical data chapter.
- The location is well ventilated or air-conditioned.
- The location is not next to heat sources.
- The location is protected against sparks and open fire.
- The floor space corresponds to the technical data.
- The floor is level, vibration-free and designed for the weight of the device.

**Electrical connection**
- Mains/power connection in accordance with the name plate
- The mains/power switch of the device and the disconnecting device of the power system circuit (e.g., residual current circuit breaker) are accessible during operation.

> Contact your safety officer for information on further requirements when installing the device.

## 4.2 Preparing installation
### 4.2.1 Unpacking the device

1. Check the packaging for damage.
2. Unpack the device in accordance with the unpacking instructions.

### 4.2.2 Checking the delivery

1. Check the delivery for completeness.
2. Check the device and accessories for transport damage.
3. Do not commission the device if the packing or the device is damaged. Contact Eppendorf AG customer service or your Eppendorf partner.

### 4.2.3 Transporting the device to the location

Personal protective equipment
  • Protective clothing, safety shoes

Prerequisites
  • The location meets the requirements.

▶ Transport the device to the location (see *Transport on p. 55)*.

### 4.2.4 Installing the device

Prerequisites
- The device is in its intended position.
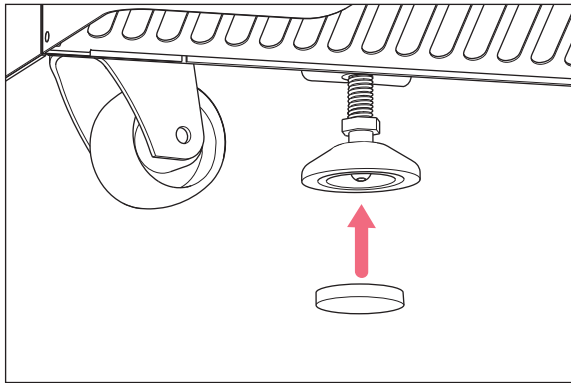


1. Attach anti-slipping pads to the underside of the leveling feet.
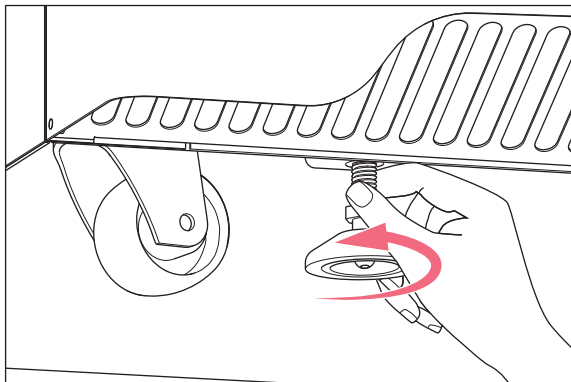


2. Rotate the leveling feet down.

3. Remove the adhesive tape from the air intake grille.

## 4.3 Connecting the device to the voltage supply

**WARNING! Danger due to incorrect voltage supply.**

- ▶ Only connect the device to voltage sources which correspond with the electrical requirements on the name plate.
- ▶ Only use earth/grounded sockets with a protective earth (PE) conductor.
- ▶ Only use the mains/power cord supplied.

Prerequisites
- Mains/power connection in accordance with the name plate

1. If several mains/power cords are included, select the mains/power cord according to the mains/power supply voltage.

2. Connect the mains/power cord at the rear of the device.

3. Fasten the safety clamp.

   If the device is moved, the mains/power cord cannot be pulled out of the device.

## 4.4 Connecting the device to external systems

### 4.4.1 Remote alarm interface
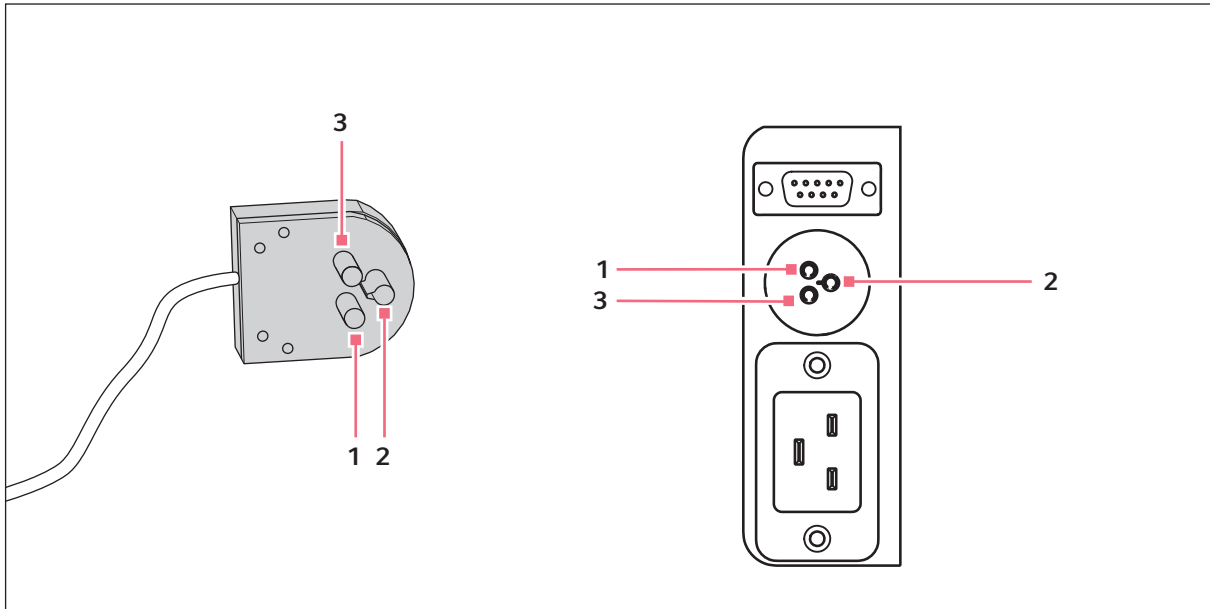


| 1 | Pin 1 and socket 1 | 3 | Pin 3 and socket 3 |
|---|---|---|---|
| 2 | Pin 2 and socket 2 | | |

You can connect the device to a building management system via the remote alarm interface.

The following alarms are forwarded to the building management system:
- Alarm in the case of a mains/power outage
- Alarm that the temperature inside the device is too high
- Alarm that the temperature inside the device is too low

The plug is included in the delivery package. Connections must have double or reinforced insulation as described in DIN EN 61010-1.

### 4.4.2 RS-485 interface

You can connect the device to external monitoring systems via the RS-485 interface.

The RS-485 interface can be used to read out various parameters, such as the interior temperature. You can forward all alarms to an external system.

Connections must have double or reinforced insulation as described in DIN EN 61010-1.

## 4.5 Turning on the device

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⚠️ **WARNING! Electric shock due to damage to the device or mains/power cord.**

▸ Only switch on the device if the device and mains/power cord are undamaged.
▸ Only operate devices which have been installed or repaired properly.
▸ In case of danger, disconnect the device from the mains/power supply voltage. Disconnect the mains/power plug from the device or the earth/grounded socket. Use the isolating device intended for this purpose (e.g. the emergency switch in the laboratory).

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**NOTICE! Damage to electronic components due to condensation.**
Condensate may form in the device when it has been transported from a cool environment to a warmer environment.

▸ After installing the device, wait for at least 6 h. Only then connect the device to the mains/power line.

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### 4.5.1 Enabling the back-up circuit

The back-up circuit is battery-powered. In the event of a mains/power outage, the battery will supply power to the control panel and the alarm for 72 hours.

Tools and auxiliary equipment
• Key for the switch locking plate

Prerequisites
• The device has been installed and connected according to the operating manual.
• The device has been acclimatized for at least 6 h.

1. Unlock the switch locking plate and remove the cover.

2. Switch on the battery switch.

The back-up circuit is enabled.
•  An alarm is triggered in the event of a mains/power outage.
•  In the event of a mains/power outage, power will still be supplied to the control panel.
•  The software settings are saved in the event of a mains/power outage.
•  The battery is charged with mains power. The battery is fully charged after approx. 24 hours.

3. Fit the cover and lock it.

### 4.5.2 Switching the device on at the mains/power switch

Tools and auxiliary equipment
• Key for the switch locking plate

Prerequisites
• The device has been installed and connected according to the operating manual.
• The device has been acclimatized for at least 6 h.

1. Unlock the switch locking plate and remove the cover.
2. Switch on the mains/power switch.
   • The display shows the software version number.
   • The compressor starts running after a short time delay.

3. Fit the cover and lock it.

## 4.6 Basic device settings

To commission the device, set the following values. Further settings are described in the Software chapter.

1. Set the desired temperature for the interior of the device.
2. Set the temperature offset.
3. Set alarm limits.
4. Set a delay time for the alarm.
5. Check the alarms.

# 5 Operation
## 5.1 Opening the outer door

Prerequisites
- The outer door is not locked.
- Pressure compensation has finished.
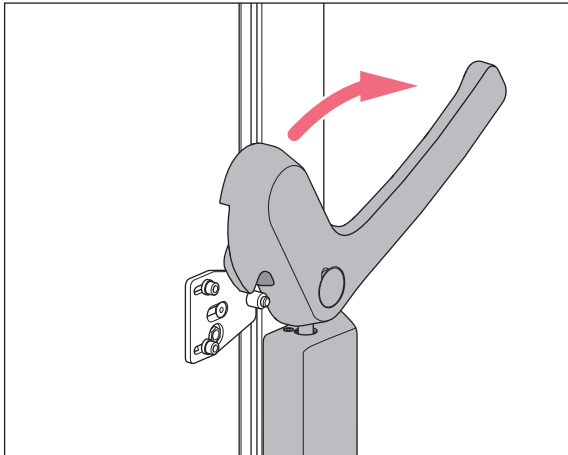


1. Pull the door handle forward and down.
   The door handle releases the peg. The outer door is unlocked.
2. To open the outer door, pull the door handle forward.

## 5.2 Loading the device

**NOTICE! Longer pull-down time because the device is loaded too early**
If you load the device during the cooling phase, the pull-down time will be longer. The pull-down time specified in the technical data cannot be achieved.
The pull-down time is the time needed for the device to cool the interior from the ambient temperature to the set temperature.

▶ Allow the device to cool down from ambient temperature to the set temperature.
▶ Place the samples in the device after the device has reached the set temperature.

**CAUTION! Risk of head injury due to open inner door**
There is a risk of hitting your head against the upper inner doors when they are open.

▶ Only open one inner door at a time.
▶ Immediately close the inner door after completing your work.

The interior temperature of the device increases when loading it:
- Outer and inner doors are open.
- The sample temperature differs from the interior temperature.

▶ To minimize the temperature increase in the interior, load the device step by step.

Prerequisites
- Racks and accessories have been placed in the compartments.
- Device, racks and accessories have reached the set temperature.

1. Open the outer door.
2. Open the inner door of the compartment in which you want to place the samples.
3. Place the samples in the device.

   Information on the maximum carrying capacity of the inner shelves can be found in the technical data.

4. Close the inner door.
5. Close the outer door.


## 5.3     Close the outer door.

---

**CAUTION! Risk of crushing your fingers when closing the outer door**

▸  Do not place your fingers between the device and the outer door.
▸  Do not touch the peg and the covers of the door lock when closing the outer door.

---

**NOTICE! Damage to the door handle due to incorrect closing of the outer door.**
Closing the outer door while the door handle is in the upright position may damage the door handle and the peg.

1. Pull the door handle down first.
2. Then close the outer door.

---
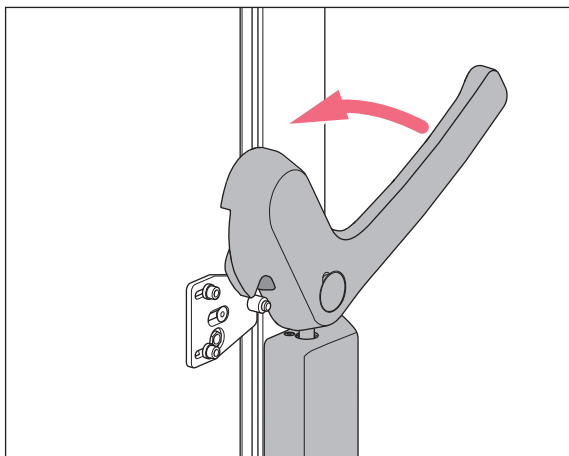
1. Pull the door handle forward and down.
2. Close the outer door.

3. To lock the outer door, push the door handle up.
   The door handle covers the peg. The outer door is closed.
   Automatic pressure compensation takes place as soon as the outer door is closed.

## 5.4     Pressure compensation

If you leave the outer door open for a while, the temperature in the interior will increase. After closing the outer door, the air in the interior will cool down and the atmospheric pressure will decrease. Negative pressure may occur in the device. If negative pressure occurs, the outer door can no longer be opened.

Pressure compensation takes place automatically to reestablish ambient pressure in the device. Pressure compensation takes 1 to 2 minutes. Pressure compensation starts as soon as the outer door is closed.

▶ To speed up pressure compensation, press the *auto vent* valve.

## 5.5     Switching off the device

**WARNING! Electric shock due to damage to the device or mains/power cord.**

▶ Only switch on the device if the device and mains/power cord are undamaged.
▶ Only operate devices which have been installed or repaired properly.
▶ In case of danger, disconnect the device from the mains/power supply voltage. Disconnect the mains/power plug from the device or the earth/grounded socket. Use the isolating device intended for this purpose (e.g. the emergency switch in the laboratory).

### 5.5.1     Disabling the back-up circuit

Tools and auxiliary equipment
 • Key for the switch locking plate

1. Unlock the switch locking plate and remove the cover.

2. Switch off the battery switch.

The back-up circuit is disabled.
   • No alarm is triggered in the event of a mains/power outage.
   • During a mains/power outage, there will be no power supply to the control panel.
   • The battery is not charged.

### 5.5.2     Disconnecting the device from the voltage supply

Tools and auxiliary equipment
 • Key for the switch locking plate

1. Unlock the switch locking plate and remove the cover.

2. Switch off the mains/power switch.

# 6 Software

## 6.1 Overview of the control panel



Fig. 6-1: Control panel

**1 *auto vent* valve**
Automatic pressure compensation

**2 Display**
During operation the display shows the actual temperature in the interior.

**3 Numerical keys**
Access functions. Enter values.

**4 C key**
Delete entry.

**5 E key**
Confirm your entry.

**6 alarm test mute softkey**
Disable the signal tone. Test the signal tone.

**7 code change softkey**
Change the lock code.

**8 lock softkey**
Lock or unlock control panel.

**9 high alarm softkey**
Display and adjust the alarm limit for the maximum interior temperature.

**10 low alarm softkey**
Display and adjust the alarm limit for the minimum interior temperature.

**11 set temp softkey**
Display and adjust the set interior temperature.

**12 battery-low indicator light**
Lights up or flashes if the voltage in the back-up circuit is too low.
Lights up if no mains/power supply voltage is available.

**13 fault indicator light**
Lights up if a system error has occurred.

**14 filter clean indicator light**
Lights up if the air filter needs to be cleaned.

**15 power fail indicator light**
Flashes if no mains/power supply voltage is supplied to the device.
The signal tone sounds while the indicator light is flashing.

**16 temp-alarm indicator light**
Lights up if an alarm limit for the interior temperature has been exceeded.

**17 remote control indicator light**
Lights up if the device is controlled by means of a computer.

## 6.2 Checking parameters

### 6.2.1 Displaying the set temperature for the interior of the device

▸ Press the **set temp** softkey.
The set temperature for the interior of the device is displayed.
The factory setting is -80 °C.

### 6.2.2 Displaying the offset for the interior temperature

▸ Press the **C** softkey.
The offset for the interior temperature is displayed.

### 6.2.3 Displaying the alarm limits for the interior temperature

▸ To display the alarm limit for the maximum interior temperature, press the **high alarm** softkey.
▸ To display the alarm limit for the minimum interior temperature, press the **low alarm** softkey.
The alarm limit is displayed.

### 6.2.4 Displaying the alarm delay time

▸ To display the delay time for the on-site alarm, press the **8** softkey.
▸ To display the delay time for the remote alarm, press the **9** softkey.
The delay time is displayed.

### 6.2.5 Displaying the ambient temperature

▸ Press the **0** softkey.
The ambient temperature is displayed.

### 6.2.6 Displaying the time for cleaning the air filter

▸ Press the **7** softkey.
The display shows the time remaining until the next cleaning is due in months.

## 6.3 Working with a lock code

To prevent unauthorized programming of the device, you can use a four-digit lock code.

### 6.3.1 Unlocking and locking the device

**Unlocking the device**

Prerequisites

- The lock code is activated.

1. Press the **lock** softkey.

   If the **lock** indicator light flashes, a lock code has been set.

2. Enter the lock code.

   The actual temperature is displayed.
   The **lock** indicator light glows. The device is in programming mode. The parameters can be changed.

**Locking the device**

Prerequisites

- The lock code is activated.

3. After programming is completed, press the **lock** softkey.

   The **lock** indicator light goes out. The device is no longer in programming mode. The parameters are saved.

> ⓘ    If you press a softkey, e.g., **set temp**, while the **lock** indicator light is flashing, ---- appears on the display. The control panel is locked.

### 6.3.2 Activating and changing the lock code

---

> **NOTICE! No software access due to lost lock code**
> If you lose the lock code, reprogramming of the device will no longer be possible.
> The lock code will have to be reset by an authorized service technician.
>
> ▸ Keep the lock code in a safe place.

---

In the factory setting, the lock code is deactivated. To activate or change the lock code, proceed as follows.

1. Press the **lock** softkey.
2. When the **lock** indicator light flashes, enter the lock code.

   The **lock** indicator light glows. The device is in programming mode. The parameters can be changed.

3. Press the **code change** softkey.

   The **code change** indicator light flashes. The display is empty.

4. Enter a lock code using the numerical keys.

   The lock code is displayed.

5. Check the lock code on the display.

6. To delete the entry, press softkey **C**.

7. Confirm the entry. To do so, press softkey **E**.

   The **code change** indicator light goes out.
   The new lock code is active.

8. Exit programming mode. To do so, press the **lock** softkey.

   The **lock** indicator light goes out. The device is no longer in programming mode. The parameters are saved.

### 6.3.3 Deactivating the lock code

To deactivate the lock code, set it to **0000**.

1. Press the **lock** softkey.

   The **lock** indicator light flashes.

2. Enter the current lock code.

   The actual temperature is displayed.
   The **lock** indicator light glows. The device is in programming mode. The parameters can be changed.

3. Press the **code change** softkey.

   The **code change** indicator light flashes. The display is empty.

4. Enter the lock code **0000** using the numerical keys.

   Entering the lock code **0000** will deactivate the lock code.
   The lock code *0000* is displayed.

5. Check the lock code on the display.

6. To delete the entry, press softkey **C**.

7. Confirm the entry. To do so, press softkey **E**.

   The **code change** indicator light goes out.
   The new lock code is deactivated.

8. Exit programming mode. To do so, press the **lock** softkey.

   The **lock** indicator light goes out. The device is no longer in programming mode. The parameters are saved.

## 6.4 Programming parameters

### 6.4.1 Setting the set temperature for the interior

You can set the set temperature for the interior of the device to a range from -50 °C to -86 °C.

Prerequisites
- The device is not protected by a lock code.

1. Press the **lock** softkey.

   The **lock** indicator light glows. The device is in programming mode. The parameters can be changed.

2. Press the **set temp** softkey.

   The **set temp** indicator light flashes. *0* is displayed.

3. Enter the set temperature with the numerical keys.

   The set temperature is displayed. The set temperature is automatically displayed as a negative value.

4. To delete the entry, press the **C** softkey.

5. Confirm your entry. To do so, press the **E** softkey.

   The **set temp** indicator light goes out.

6. Exit programming mode. To do so, press the **lock** softkey.

   The **lock** indicator light goes out. The parameters are saved.

### 6.4.2 Setting an offset for the set temperature in the interior

You can define an offset for the set temperature in the interior within a range from 0 °C to -5 °C. The offset is added to the set temperature. The temperature cannot fall below -86 °C.

Prerequisites
- The device is not protected by a lock code.

1. Press the **lock** softkey.

   The **lock** indicator light glows. The device is in programming mode. The parameters can be changed.

2. Press the **C** softkey.

3. Enter the offset using the numerical keys.

   The offset is displayed.
   To deactivate the offset, enter 0.

4. To delete the entry, press the **C** softkey.

5. Confirm your entry. To do so, press the **E** softkey.

6. Exit programming mode. To do so, press the **lock** softkey.

   The **lock** indicator light goes out. The parameters are saved.

### 6.4.3     Setting alarm limits

You can set alarm limits for the interior temperature. If the interior temperature exceeds an alarm limit, an alarm will be triggered.

|  | Minimum value | Maximum value |
|---|---|---|
| Alarm limit for the minimum temperature in the interior | -91 °C | 5 °C below the set temperature |
| Alarm limit for the maximum temperature in the interior | 5 °C above the set temperature | -10 °C |

Prerequisites
  • The device is not protected by a lock code.

1. Press the **lock** softkey.
   The **lock** indicator light glows. The device is in programming mode. The parameters can be changed.

2. To set the alarm limit for the maximum interior temperature, press the **high alarm** softkey.
   The **high alarm** indicator light flashes. *0* is displayed.

3. To set the alarm limit for the minimum interior temperature, press the **low alarm** softkey.
   The **low alarm** indicator light flashes. *0* is displayed.

4. Enter the alarm limit using the numerical keys.
   The alarm limit is displayed.

5. To delete the entry, press the **C** softkey.

6. Confirm your entry. To do so, press the **E** softkey.
   The **high alarm** indicator light goes out.

7. Exit programming mode. To do so, press the **lock** softkey.
   The **lock** indicator light goes out. The parameters are saved.

### 6.4.4     Setting an alarm delay time

You can set a delay time for the "Interior temperature too high" and "Interior temperature too low" alarms. The delay time can be set for the on-site alarm and the remote alarm.

|  | Minimum value | Maximum value | Factory setting |
|---|---|---|---|
| On-site alarm | 0 min | 40 min | 30 min |
| Remote alarm | 0 min | 40 min | 30 min |

If you set the delay time to 0 min, the delay time will automatically be set to 15 s.

Prerequisites
• The device is not protected by a lock code.

1. Press the **lock** softkey.

   The **lock** indicator light glows. The device is in programming mode. The parameters can be changed.

2. To set the delay for the on-site alarm, press the **8** softkey.

3. To set the delay for the remote alarm, press the **9** softkey.

   *PP* is displayed.

4. Enter the delay time using the numerical keys.

   The delay time is displayed.

5. To delete the entry, press the **C** softkey.

6. Confirm your entry. To do so, press the **E** softkey.

   --- is displayed. The value is saved.

7. If the entered value is outside the limit values, *EE* is displayed. Repeat the entry.

8. Exit programming mode. To do so, press the **lock** softkey.

   The **lock** indicator light goes out. The parameters are saved.

### 6.4.5    Setting the interval for cleaning the air filter

You can set the interval for cleaning the air filter to a range from 0 months to 12 months. The factory setting is 3 months.

Prerequisites
  • The device is not protected by a lock code.

1.  Press the **lock** softkey.
    The **lock** indicator light glows. The device is in programming mode. The parameters can be changed.

2.  Press the **alarm test/mute** softkey.
3.  Enter the interval for the air filter check.
    The interval is displayed.
    To deactivate the function, enter 0.
4.  To delete the entry, press the **C** softkey.
5.  Confirm your entry. To do so, press the **E** softkey.
6.  Exit programming mode. To do so, press the **lock** softkey.
    The **lock** indicator light goes out. The parameters are saved.

### 6.4.6    Confirming the message for cleaning the air filter

When the interval for cleaning the air filter has elapsed, the **filter clean** indicator light will start to flash.

1.  Clean the air filter (see *Cleaning the air filter and the air intake grille on p. 49)*.
2.  Press the **7** softkey for 10 seconds.
The **filter clean** indicator light goes out.

The display shows the time remaining until the next cleaning is due in months. Time counting restarts from the beginning.

🛈     You can also restart the time counter from the beginning without cleaning the air filter.

# 7 Maintenance

## 7.1 Service schedule

| Service | Service cycle |
|---|---|
| Defrost the device. | As required |
| Clean the interior and exterior of the device. | As required |
| Clean the seals. | Once a month |
| Clean the air filter and the air intake grille. | Every 3 months under normal ambient conditions. Clean more frequently if the surroundings are very dusty or dirty. |

## 7.2 Defrosting the device

⚠ **CAUTION! Risk of slipping due to melt water**
Puddles may form on the laboratory floor when defrosting the device.

▸ Clean up the melt water immediately.

**NOTICE! Damage to device due to scraping off ice.**
Removing ice with a sharp object may damage the device.

▸ Wait until the ice has thawed by itself.

Tools and auxiliary equipment
• Personal protective equipment: Cold protection gloves, protective goggles, dust protection mask
• Material for absorbing the melt water
• "Defrosting device" notice sign

Prerequisites
• The samples have been transferred to another ULT freezer.
• The device is switched off and disconnected from the mains/power line (see p. 37).

1. Put up the notice sign.
2. Open the outer and inner doors.
3. Wait until the ice has thawed.
4. Absorb the melt water.
5. Dry the interior of the device.

## 7.3 Cleaning and decontamination

⚠ **DANGER! Electric shock.**

▸ Switch off the device and disconnect the mains/power plug before commencing any service or cleaning operations.

✳ **NOTICE! Damage from the use of aggressive chemicals.**

▸ Do not use any aggressive chemicals on the device or its accessories, such as strong and weak bases, strong acids, acetone, formaldehyde, halogenated hydrocarbons or phenol.
▸ If the device has been contaminated by aggressive chemicals, clean it immediately using a mild cleaning agent.

### 7.3.1 Cleaning the device

Tools and auxiliary equipment
• Water
• Mild cleaning agent
• Soft, lint-free cloth

Prerequisites
• For cleaning the interior: The device is switched off and disconnected from the mains/power line.
• The device is defrosted.

1. If required, lift the inner shelf upwards out of the device.

2. Moisten the lint-free cloth with water and cleaning agent.

3. Clean the surfaces.

### 7.3.2 Cleaning and disinfecting the control panel

Tools and auxiliary equipment
• Laboratory cleaner
• Lint-free cloth
• Disinfectant: Ethanol 70%, sodium hypochlorite solution 1%, Dismozon pur, Hexaquart S, Biozid ZF or another suitable disinfectant

1. To lock the control panel, press the **lock** softkey.

2. Moisten the lint-free cloth with laboratory cleaner or disinfectant.

3. Wipe the control panel with the cloth.

4. Unlock the locked control panel.

### 7.3.3 Cleaning the seals

Tools and auxiliary equipment
• Dry soft lint-free cloth

1. Wipe the seal with a soft, lint-free cloth.
2. Wipe the contact surface on which the seal is seated with a soft, lint-free cloth.

### 7.3.4 Cleaning the air filter and the air intake grille

---

**NOTICE! Refrigeration failure due to blocked air filter**
If the air filter is blocked, the refrigerant will not be liquefied. This will damage the compressor.

▸ Regularly ensure that the air flow into the device is not obstructed.

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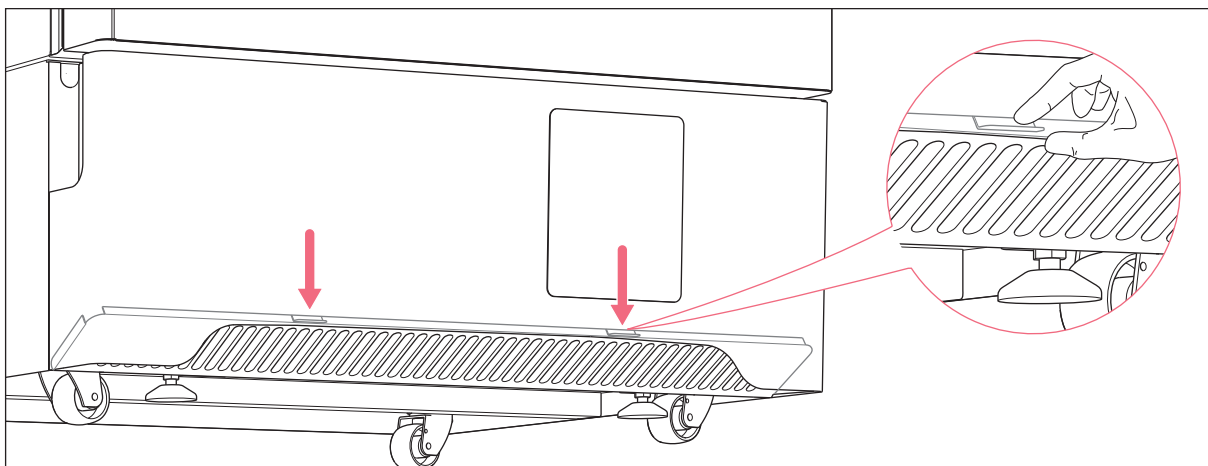


Fig. 7-1: Folding down the air intake grille

An airflow from the surroundings flows through the air filter to the condenser. The airflow carries the heat away from the condenser.

The air filter protects the condenser and the components behind it against contamination and dirt. If the air filter is dirty, not enough air will reach the condenser. The condenser will overheat and the refrigeration system may fail.

Tools and auxiliary equipment
• Vacuum cleaner
• Warm water

1. Set the interval for cleaning the air filter in the software.

   When the interval has elapsed, the **filter-clean** indicator light will start to flash.

2. Place your fingers into the recesses on the air intake grille. Press the air intake grille downwards.

   The air intake grille folds down.

3. Remove the air filter.
4. Clean the air intake grille with the vacuum cleaner.
5. Alternatively, clean the air intake grille with a soft brush.
6. Remove the coarse dirt from the air filter by vacuuming or tapping it.
7. Clean the air filter with warm water.
8. Let the air filter dry.
9. Insert the air filter.
10. Press the air intake grille upwards and close it.

### 7.3.5 Decontaminating the interior and the inner shelves

The interior and the inner shelves are made of stainless steel.

Tools and auxiliary equipment
- Decontamination agent consisting of 70 % isopropyl alcohol and 30 % distilled water
- Soft, lint-free cloth

Prerequisites
- The device is switched off and disconnected from the mains/power line.
- The device is defrosted.

1. Lift the inner shelf upwards out of the device.
2. Moisten the lint-free cloth with decontamination agent.
3. Clean the surfaces using the lint-free cloth.
   The surfaces are dampened with a decontamination agent.
4. Allow the decontamination agent to take effect.
5. Wipe off the decontamination agent with deionized water.
6. Allow the surfaces to dry.

## 7.4 Fuses

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

## 7.5 Checking the alarm

### 7.5.1 Checking indicator lights and the signal tone

▶ Press the **alarm test/mute** softkey.

As long as the **alarm test/mute** softkey is pressed, all indicator lights are lit.
The signal tone sounds.

### 7.5.2 Checking the alarm in the case of a mains/power outage

Prerequisites

• The back-up circuit is enabled.

▶ Switch off the device using the mains/power switch.

The **power fail** indicator light glows.
The display shows the interior temperature and flashes at intervals of 10 s.
The signal tone sounds on the device.
If the device is connected to a building management system via the remote alarm interface, the alarm is forwarded to the building management system.

# 8 Troubleshooting

## 8.1 General errors

If you are unable to resolve the error with the suggested measures, please contact your Eppendorf partner. The address can be found on our website: www.eppendorf.com.

### 8.1.1 Outer door

| Problem | Cause | Solution |
|---|---|---|
| The outer door cannot be opened. | • The door handle is locked. | ▶ Unlock the door handle. |
| The outer door cannot be opened. | • The *auto vent* valve is blocked. The negative pressure in the interior prevents the outer door from being opened. | ▶ Wait until pressure compensation has taken place. The balancing of pressure takes 1 to 2 hours.<br>▶ After opening the outer door, remove the ice from the *auto vent* valve. |

### 8.1.2 Air filter

| Problem | Cause | Solution |
|---|---|---|
| The **filter clean** indicator light glows. | • The air filter is contaminated. | ▶ Clean the air filter. |

## 8.2 Software error messages

| Problem | Cause | Solution |
|---|---|---|
| Code *E-01* The device triggers an alarm. | • The temperature sensor for measuring the interior temperature does not work. | ▶ Contact your Eppendorf partner. |
| Code *E-02* The device triggers an alarm. | • The temperature sensor at the condenser does not work. | ▶ Contact your Eppendorf partner. |
| Code *E-03* The device triggers an alarm. | • The temperature sensor at the heat exchanger does not work. | ▶ Contact your Eppendorf partner. |
| Code *E-04* | • The temperature at the condenser is too high. | ▶ Clean the air filter.<br>▶ Establish an ambient temperature that complies with the technical data.<br>▶ Contact your Eppendorf partner. |
| Code *E-05* | • The temperature sensor for measuring the ambient temperature does not work. | ▶ Contact your Eppendorf partner. |
| Code *E-06 – E12, E14 – E20* | • Internal error messages | ▶ Contact your Eppendorf partner. |
| Code *E-13* | • The fan does not work. | ▶ Contact your Eppendorf partner. |

## 8.3 Mains/power outage

During a mains/power outage, no mains/power supply is supplied to the device.

The "Mains/power outage" alarm exists to ensure that a mains/power outage does not remain unnoticed (see *Alarms on p. 24*).

All danger signals go out once the device is supplied with power again.

If the interior temperature is below the alarm limit for the maximum temperature in the interior after the mains/power outage, the device continues to operate normally.

If the mains/power supply was interrupted for a longer period of time, the interior temperature may have risen. If the interior temperature is above the alarm limit for the maximum temperature in the interior, the "Mains/power outage" alarm is triggered after the delay time has elapsed.

## 8.4 Heating of the interior

When the doors of the device are open, warm ambient air enters the device. The temperature inside the device increases.

To prevent the interior temperature from rising in an uncontrolled manner, an "Interior temperature too high" alarm exists (see *Heating of the interior on p. 54*).

▸ To avoid the inside of the device heating up, only open the outer door and the inner doors briefly.

# 9 Transport, storage and disposal
## 9.1 Decommissioning

Tools and auxiliary equipment
• Adhesive tape

Prerequisites

• Racks and samples have been transferred to another ULT freezer.

1. Secure the air intake grille with adhesive tape.
2. Disable the back-up circuit (see p. 37).
3. Disconnect the device from the voltage supply (see p. 37).
4. Remove the safety clamp of the mains/power cord. Remove the mains/power cord from the device.
5. Defrost the device (see p. 47).
6. Decontaminate the device (see p. 50).

## 9.2 Transport

**DANGER! Risk of injury due to tipping of the device**
If the device tips over and falls on a person, the person may sustain fatal injuries.

‣ Transport the device with a sufficient number of helpers.
‣ Do not transport the device over ramps at an angle > 17 % (10°). Transport the device sideways over ramps.
‣ Only lift the device with a transport aid.

**CAUTION! Risk of foot injury due to little ground clearance**
Feet can easily get trapped under the device.

‣ Wear safety shoes with steel toes.

**NOTICE! Damage to device due to lifting the device without the original pallet**
Lifting the device without the original pallet will damage the base of the device.

1. Place the device on the original pallet.
2. Secure the device.
3. Use a transport aid to lift the device.

**NOTICE! Damage to the compressors and the refrigeration cycle due to tilting of the device**
Tilting the device or transporting it in a horizontal position will damage the compressors and the refrigeration cycle. Refrigerant and oil may leak out.

‣ Transport the device in an upright position.
‣ After setting up the device, wait for 6 h before switching it on.

**NOTICE! Damage due to exposing the compressors to shocks**
Shocks may dislodge the compressors from the brackets.

- ‣ Move the device with due caution and care.
- ‣ Do not knock the device into anything.
- ‣ Protect the device from shocks.

**NOTICE! Damage to electronic components due to condensation.**
Condensate may form in the device when it has been transported from a cool environment to a warmer environment.

- ‣ After installing the device, wait for at least 6 h. Only then connect the device to the mains/power line.

**NOTICE! Damage to the door handle due to too high loads**
Pulling or pushing the device on the door handle during transport may damage the door handle.

- ‣ Grip the device at the housing to pull or push it.

**NOTICE! Transport damage to the control panel**
The control panel protrudes from the door. The control panel may get damaged during transport.

- ‣ Only transport the device with the transport protection attached to the control panel.

### 9.2.1    Preparing the device for transport

Tools and auxiliary equipment
- Open-end wrench
- Adhesive tape

Prerequisites
- Racks and samples have been transferred to another ULT freezer.

1. Secure the air intake grille with adhesive tape.
2. Disable the back-up circuit (see p. 37).
3. Disconnect the device from the voltage supply (see p. 37).
4. Remove the safety clamp of the mains/power cord. Remove the mains/power cord from the device.
5. Use the open-end wrench to turn the leveling feet upward (Fig. 4-1 on p. 31).

### 9.2.2 Transporting the device

Personal protective equipment
• Protective clothing, safety shoes

Tools and auxiliary equipment
• Transport aid
• Original pallet

**General transport**

1. Transport the device in an upright position.

2. Grip the device at the housing and wheel it to its new location.

   Do not grip the device at the door handle.

**Lifting the device**

3. Place the device on the original pallet and secure it.

4. Lift the device with a transport aid.

**Sloping surfaces**

5. Transport the device sideways over ramps.

6. Do not transport the device over ramps at an angle > 17 % (10°).

**Narrow passageways**

7. Open the door of the device 180°.

8. Push the device, with one side panel to the front, through the passageway.

   If the passageway is too narrow for the device, housing parts may have to be disassembled. Contact your local Eppendorf partner for more information.

**Outside of buildings**

9. Transport the device with a transport aid.

   The heavy-duty castors are not suitable for transport outside of buildings.

   If you need help to transport the device, contact the authorized service.

## 9.3 Shipment
### 9.3.1 Shipment regulations

ULT freezers have the UN number 3358 (Refrigerating machines, containing flammable, non-toxic, liquefied gas) and are subject to the relevant regulations. ULT freezers containing less than 100 g of flammable refrigerant are exempt from these regulations.

The ULT freezer CryoCube F740h contains more than 100 g of flammable refrigerant. This device must not be transported by air freight.

All other ULT freezers can be declared as non-hazardous goods. These ULT freezers can be shipped by air, sea and road.

## 9.3.2 Shipping the device

**WARNING! Personal injury due to contamination.**
People may get contaminated if you store or ship a contaminated device.

‣ Clean and decontaminate the device before shipping or storage.

**NOTICE! Damage due to incorrect packing.**
Eppendorf AG is not liable for any damage caused by improper packing.

‣ Only store and transport the device in its original packing.
‣ If you do not have the original packing, request original packing from Eppendorf AG.

Prerequisites
• The device has been taken out of operation (see p. 55).
• The device has been cleaned and decontaminated.
• The original packing is available.

1. Download the "Decontamination declaration for product returns" from www.eppendorf.com.

2. Complete the decontamination declaration.

3. Pack the device.

4. Put the decontamination declaration into the packaging.

5. Ship the device according to the shipment regulations.

For service and repairs, send the device to Eppendorf AG or to an authorized service partner.

## 9.4     Disposal

If the product needs to be disposed of, the relevant legal regulations must 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 2012/19/EU 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 marking:



Do not dispose of batteries together with domestic waste. Dispose of batteries in accordance with local, legal regulations.

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

## 10 Technical data
## 10.1 Power supply

| | |
|---|---|
| Mains/power supply voltage | 100 V – 230 V ±10 % |
| Mains/power frequency | 50 Hz - 60 Hz |
| Current consumption | 100 V – 230 V (50 Hz); 15 A – 6 A<br>100 V – 220 V (60 Hz); 12 A – 6 A |
| Electromagnetic compatibility (EMC) | The device meets the following requirements:<br>• IEC/EN 61326-1<br>• EN 55011 (CISPR 11)<br>• FCC Part 15 – Class A |
| Overvoltage category | II |
| Degree of pollution | 2 |

## 10.2 Ambient conditions
### 10.2.1 Operation

| | |
|---|---|
| Environment | For indoor use only |
| Ambient temperature | 15 °C – 32 °C |
| Relative humidity | Maximum 80 %, non-condensing |
| Atmospheric pressure | 80 kPa – 106 kPa |

### 10.2.2 Transport

| | Air temperature | Relative humidity | Atmospheric pressure |
|---|---|---|---|
| General transport | -20°C – 35°C | 10 % – 91 % | 30 kPa – 106 kPa |
| Air freight | -20°C – 35°C | 10 % – 91 % | 30 kPa – 106 kPa |

The CryoCube F740h must not be transported by air freight.

### 10.2.3 Storage

| | Air temperature | Relative humidity | Atmospheric pressure |
|---|---|---|---|
| In transport packing | -20°C – 35°C | 10 % – 91 % | 70 kPa – 106 kPa |
| Without transport packing | -20°C – 35°C | 10 % – 91 % | 70 kPa – 106 kPa |

## 10.3 Dimensions
### 10.3.1 External dimensions
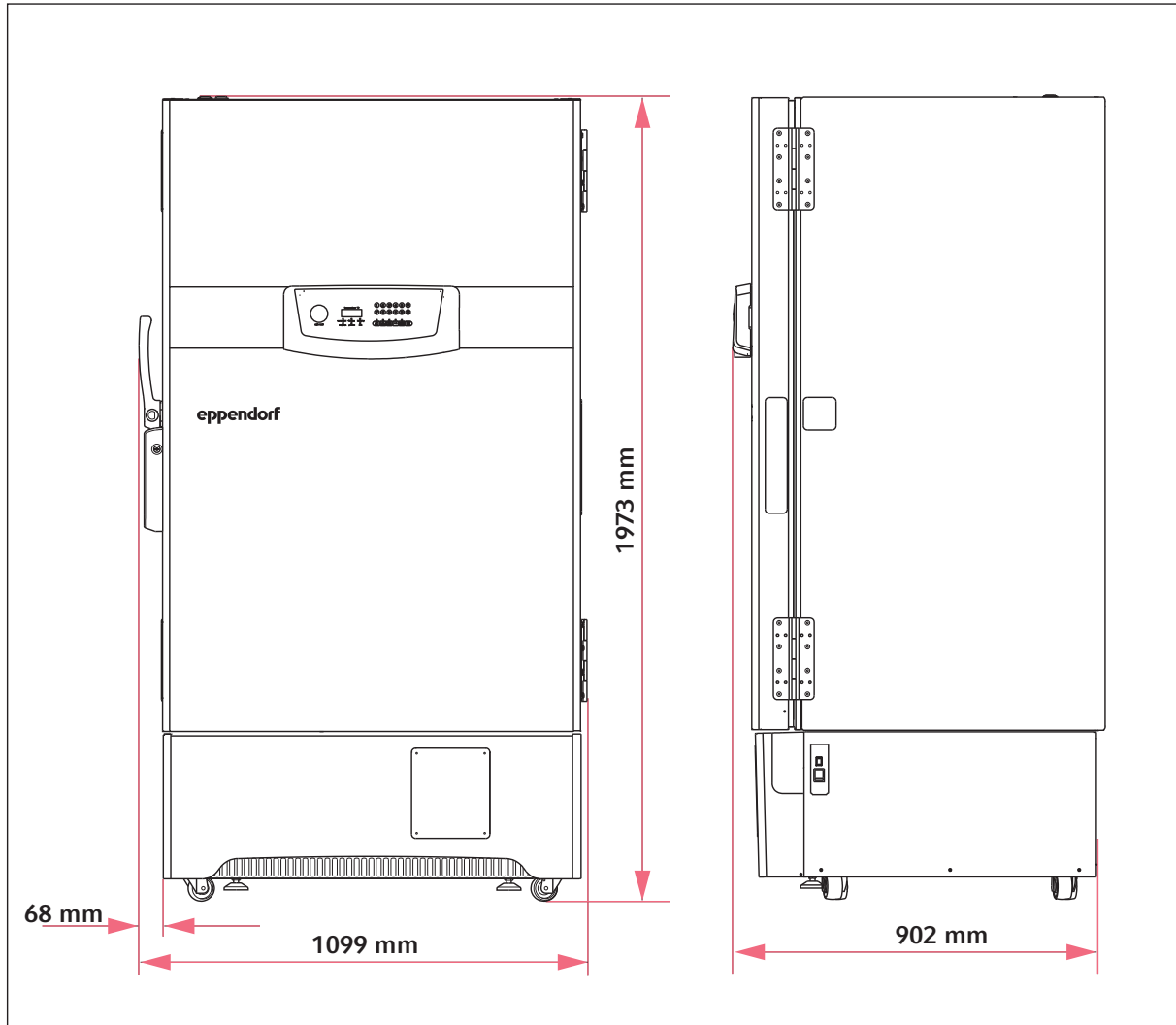
## 10.3.2    Internal dimensions
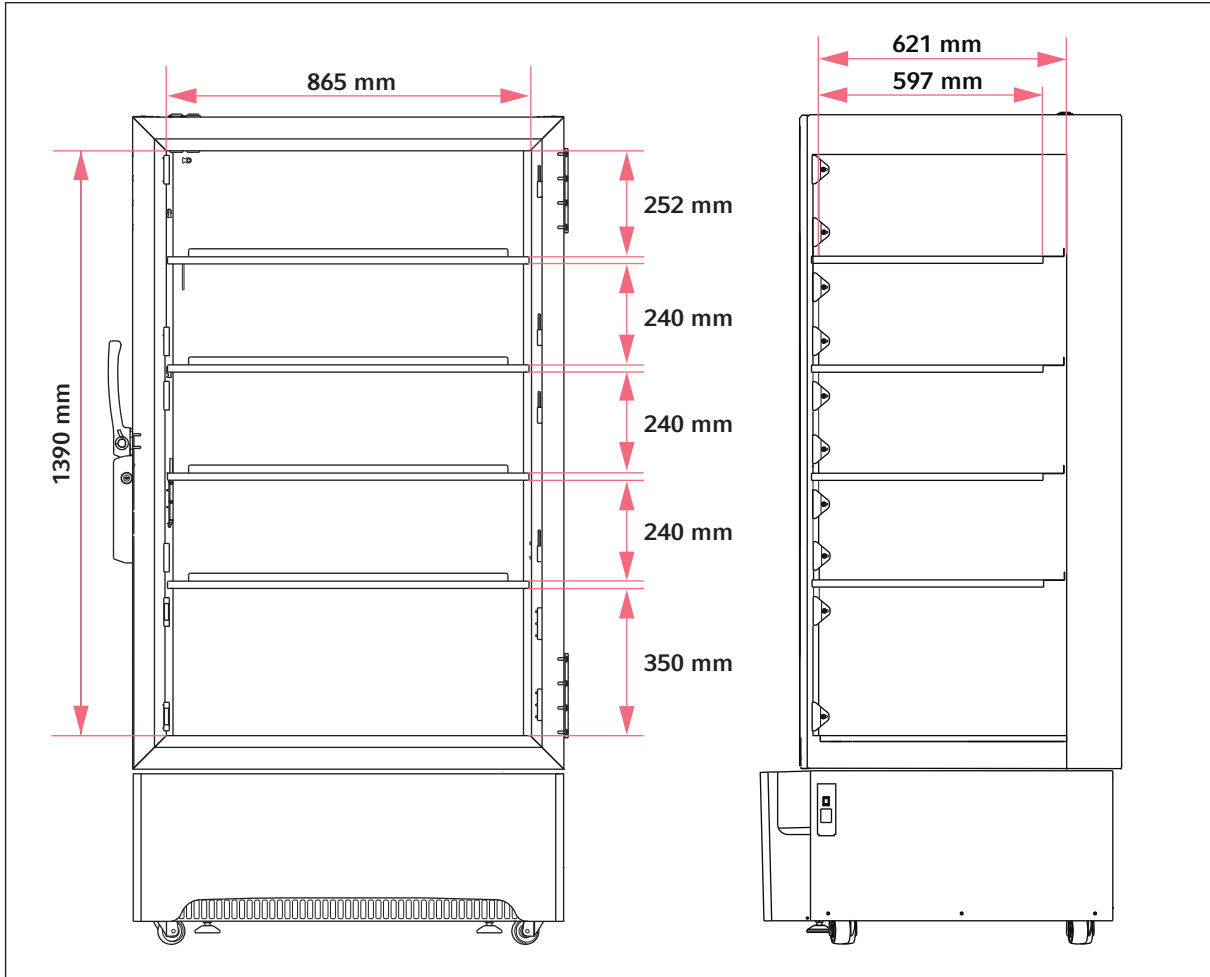


Fig. 10-1:   Internal dimensions for devices with 5 inner compartments
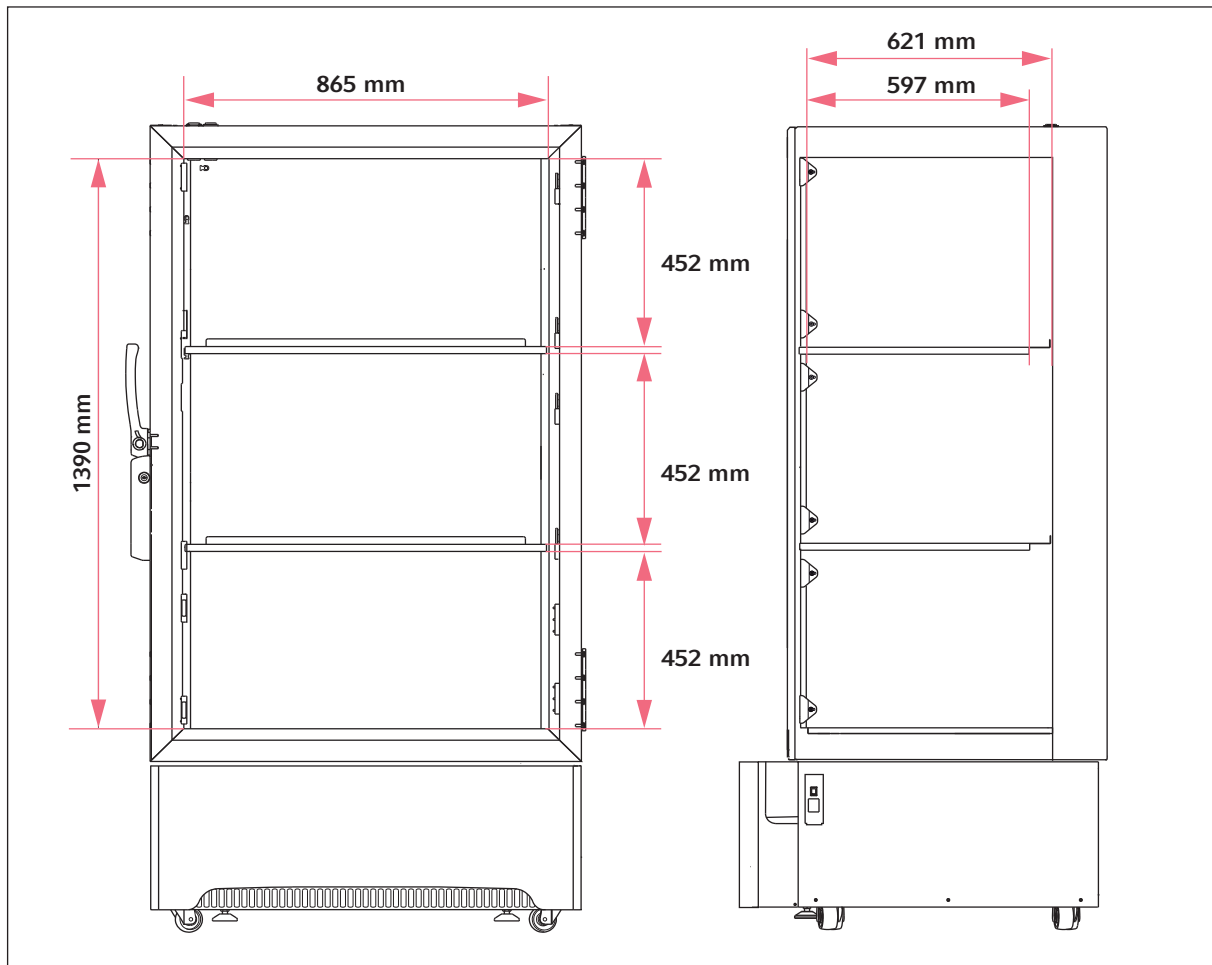
Fig. 10-2: Internal dimensions for devices with 3 inner compartments

### 10.3.3 Packing dimensions

| Width | 1200 mm |
|-------|---------|
| Depth | 1045 mm |
| Height | 2225 mm |

## 10.4 Weight

| Device | Model with 3 compartments | Model with 5 compartments |
|--------|---------------------------|---------------------------|
| CryoCube F740 | 308 kg | 317 kg |
| CryoCube F740h | 308 kg | 317 kg |

| Packed device | Model with 3 compartments | Model with 5 compartments |
|---------------|---------------------------|---------------------------|
| CryoCube F740 | 357 kg | 366 kg |
| CryoCube F740h | 357 kg | 366 kg |

## 10.5    Noise level

| | |
|---|---|
| CryoCube F740 | 47.8 dB (A) |
| CryoCube F740h | 47.8 dB (A) |

## 10.6    Interfaces

| | |
|---|---|
| BMS | Remote alarm |
| Serial interface | RS-485 |

Only connect devices that comply with the IEC 60950 (UL 60590) standards to the interfaces.

## 10.7    Temperature control
### 10.7.1    Temperature range

| | |
|---|---|
| Setting range | -50 °C to -86 °C |

### 10.7.2    Cooling of the refrigeration cycle

| | |
|---|---|
| CryoCube F740 | Air cooling |
| CryoCube F740h | Air cooling |

### 10.7.3    Refrigerant

| Device | Refrigeration cycle 1 | Refrigeration cycle 2 | Refrigeration cycle 2 additive |
|---|---|---|---|
| CryoCube F740 | R-404A (200 g) | R-508B (274 g) | R-290 (10 g) |
| CryoCube F740h | R-290 (96 g) | R-170 (106 g) | - |

| Refrigerant | Components |
|---|---|
| R-170 | Ethane |
| R-290 | Propane |
| R-404A | Pentafluoroethane (R-125), tetrafluoroethane (R-134A), trifluoroethane (R-143A) |
| R-508B | Trifluoromethane, hexafluoroethane (R-116) |

## 10.8    Additional specifications
### 10.8.1   Capacity and carrying capacity

| | |
|---|---|
| Capacity | 740 L |
| Carrying capacity per inner shelf | 150 kg |
| Carrying capacity per device | 420 kg |

### 10.8.2   Materials

| | |
|---|---|
| Outer door insulation | Vacuum insulation panels<br>Polyurethane foam |
| Device insulation | Vacuum insulation panels<br>Polyurethane foam |
| Interior | Stainless steel (304 2B) |

## 11 Ordering information
## 11.1 Accessories
### 11.1.1 Back-up systems

| Order no. (International) | Description |
|---|---|
| | **$CO_2$ back-up system** |
| F652999005 | 100 V/50 Hz - 60 Hz |
| U9043-0002 | 120 V - 220 V/60 Hz |
| U9043-0004 | 230 V/ 50 Hz |
| | **LN2 back-up system** |
| F652999006 | 100 V/50 Hz - 60 Hz |
| U9044-0002 | 120 V - 220 V/60 Hz |
| U9044-0004 | 230 V/ 50 Hz |

### 11.1.2 Chart recorder

| Order no. (International) | Description |
|---|---|
| | **Chart recorder type 2** |
| | Connection to mains/power supply in the ULT freezer |
| F652999001 | 100 V/120 V, 50 Hz – 60 Hz |
| F652999002 | 208 V – 230 V, 50 Hz – 60 Hz |
| | **Discs for chart recorder type 2** |
| | -100 °C – 0 °C |
| F625999003 | 60 pieces |

### 11.1.3    Racks

| Order no. (International) | Description |
|---|---|
| | **Rack with drawers** |
| | for devices with 3 compartments, material stainless steel |
| 6001 072.210 | depth 563 mm, width 140 mm, height 449 mm, drawer height 53 mm |
| 6001 072.910 | depth 563 mm, width 140 mm, height 412 mm, drawer height 64 mm |
| 6001 072.310 | depth 563 mm, width 140 mm, height 414 mm, drawer height 76 mm |
| 6001 072.410 | depth 563 mm, width 140 mm, height 431 mm, drawer height 102 mm |
| 6001 072.510 | depth 563 mm, width 140 mm, height 414 mm, drawer height 127 mm |
| | **Rack with drawers** |
| | for compartments 1 - 4 for devices with 5 compartments, material stainless steel |
| 6001 022.210 | depth 563 mm, width 140 mm, height 231 mm drawer height 53 mm |
| 6001 022.910 | depth 563 mm, width 140 mm, height 204 mm drawer height 64 mm |
| 6001 022.310 | depth 563 mm, width 140 mm, height 166 mm drawer height 76 mm |
| 6001 022.410 | depth 563 mm, width 140 mm, height 216 mm drawer height 102 mm |
| | **Rack with drawers** |
| | for compartment 5 for devices with 5 compartments, material stainless steel |
| 6001 082.210 | depth 563 mm, width 140 mm, height 346 mm drawer height 53 mm |
| 6001 082.910 | depth 563 mm, width 140 mm, height 344 mm drawer height 64 mm |
| 6001 082.310 | depth 563 mm, width 140 mm, height 331 mm drawer height 76 mm |
| 6001 082.410 | depth 563 mm, width 140 mm, height 324 mm drawer height 102 mm |
| 6001 082.510 | depth 563 mm, width 140 mm, height 276 mm drawer height 127 mm |
| | **Rack with side access** |
| | for devices with 3 compartments, material stainless steel |
| 6001 071.210 | depth 569 mm, width 139 mm, height 444 mm drawer height 53 mm |
| 6001 071.910 | depth 569 mm, width 139 mm, height 406 mm drawer height 64 mm |
| 6001 071.310 | depth 569 mm, width 139 mm, height 412 mm drawer height 76 mm |
| 6001 071.410 | depth 569 mm, width 139 mm, height 444 mm drawer height 102 mm |
| 6001 071.510 | depth 569 mm, width 139 mm, height 414 mm drawer height 127 mm |
| 6001 071.110 | depth 549 mm, width 139 mm, height 444 mm, with compartments for deepwell plates |
| | **Rack with side access** |
| | for compartments 1 - 4 for devices with 5 compartments, material stainless steel |
| 6001 021.210 | depth 569 mm, width 139 mm, height 230 mm drawer height 53 mm |
| 6001 021.910 | depth 569 mm, width 139 mm, height 205 mm drawer height 64 mm |
| 6001 021.310 | depth 569 mm, width 139 mm, height 167 mm drawer height 76 mm |
| 6001 021.410 | depth 569 mm, width 139 mm, height 230 mm drawer height 102 mm |
| 6001 021.110 | depth 549 mm, width 139 mm, height 224 mm, with compartments for deepwell plates |
| | **Rack with side access** |
| | for compartment 5 for devices with 5 compartments, material stainless steel |
| 6001 081.210 | depth 569 mm, width 139 mm, height 343 mm drawer height 53 mm |
| 6001 081.910 | depth 569 mm, width 139 mm, height 339 mm drawer height 64 mm |
| 6001 081.310 | depth 569 mm, width 139 mm, height 330 mm drawer height 76 mm |
| 6001 081.410 | depth 569 mm, width 139 mm, height 343 mm drawer height 102 mm |
| 6001 081.510 | depth 569 mm, width 139 mm, height 227 mm drawer height 122 mm |
| 6001 081.110 | depth 569 mm, width 139 mm, height 343 mm, with compartments for deepwell plates |

### 11.1.4 Cardboard boxes and box dividers

| Order no. (International) | Description |
| --- | --- |
| | **Cardboard box** |
| B50-SQ | width 133 mm, depth 133 mm, height 50 mm |
| B75-SQ | width 133 mm, depth 133 mm, height 75 mm |
| B95-SQ | width 133 mm, depth 133 mm, height 100 mm |
| | **Box divider** |
| D49 | for 7 × 7 vessels, maximum vessel diameter 17.4 mm |
| D64 | for 8 × 8 vessels, maximum vessel diameter 15 mm |
| D81 | for 9 × 9 vessels, maximum vessel diameter 13 mm |
| D100 | for 10 × 10 vessels, maximum vessel diameter 11.8 mm |

### 11.1.5 Eppendorf Storage Boxes

| Order no. (International) | Description |
| --- | --- |
| 0030 140.508 | **Eppendorf Storage Box 10 × 10, 2 inch**<br>height 52.8 mm, for 100 cryogenic tubes with internal thread<br>3 pieces |
| 0030 140.516 | **Eppendorf Storage Box 9 × 9, 2 inch**<br>height 52.8 mm, for 81 screw cap (cryogenic) tubes 1 mL - 2 mL<br>3 pieces |
| 0030 140.524 | **Eppendorf Storage Box 8 × 8, 2 inch**<br>height 52.8 mm, for 64 micro test tubes 1 mL - 2 mL<br>3 pieces |
| 0030 140.532 | **Eppendorf Storage Box 8 × 8, 2.5 inch**<br>height 63.5 mm, for 25 micro test tubes 5 mL<br>4 pieces |
| 0030 140.540 | **Eppendorf Storage Box 9 × 9, 3 inch**<br>height 76.2 mm, for 81 screw cap (cryogenic) tubes 3 mL<br>2 pieces |
| 0030 140.567 | **Eppendorf Storage Box 9 × 9, 4 inch**<br>height 101.6 mm, for 81 screw cap (cryogenic) tubes 4 mL - 5 mL<br>2 pieces |
| 0030 140.583 | **Eppendorf Storage Box 5 × 5, 5 inch**<br>height 127 mm, for 25 conical tubes 15 mL<br>2 pieces |
| 0030 140.591 | **Eppendorf Storage Box 3 × 3, 5 inch**<br>height 127 mm, for 9 conical tubes 50 mL and 4 conical tubes 15 mL<br>2 pieces |
| 0030 140.613 | **Eppendorf Storage Box 5 × 5, 3 inch**<br>height 76.2 mm, for 25 screw cap tubes 5 mL<br>2 pieces |

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