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CryoCube® F740

Operating manual

CT0540-0000-013-01/012018

Table of contents

1 Operating instructions

1.1 Using this manual

- Read this operating manual thoroughly before using the device for the first time. Also observe the instructions for use of the accessories.
- This operating manual is part of the product. It must always be kept easily accessible.
- Enclose this operating manual when transferring the device to third parties.
- You will find the current version of the operating manual for all available languages on our website at 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 used

Depiction	Meaning
1. 2.	Actions in the specified order
▸	Actions without a specified order
•	List
Text	Display or software texts
	Additional information

1.4 Operating manual version overview

Order no. CT0540-0000-013

Version	Date	Change
00	April 2017	Created new
01	December 2017	Completely revised

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.
- Consult the "Laboratory Biosafety Manual" (source: World Health Organization, Laboratory Biosafety Manual, in its respectively current valid version).

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.
Touching parts which are under high voltage may cause 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.

2.3 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

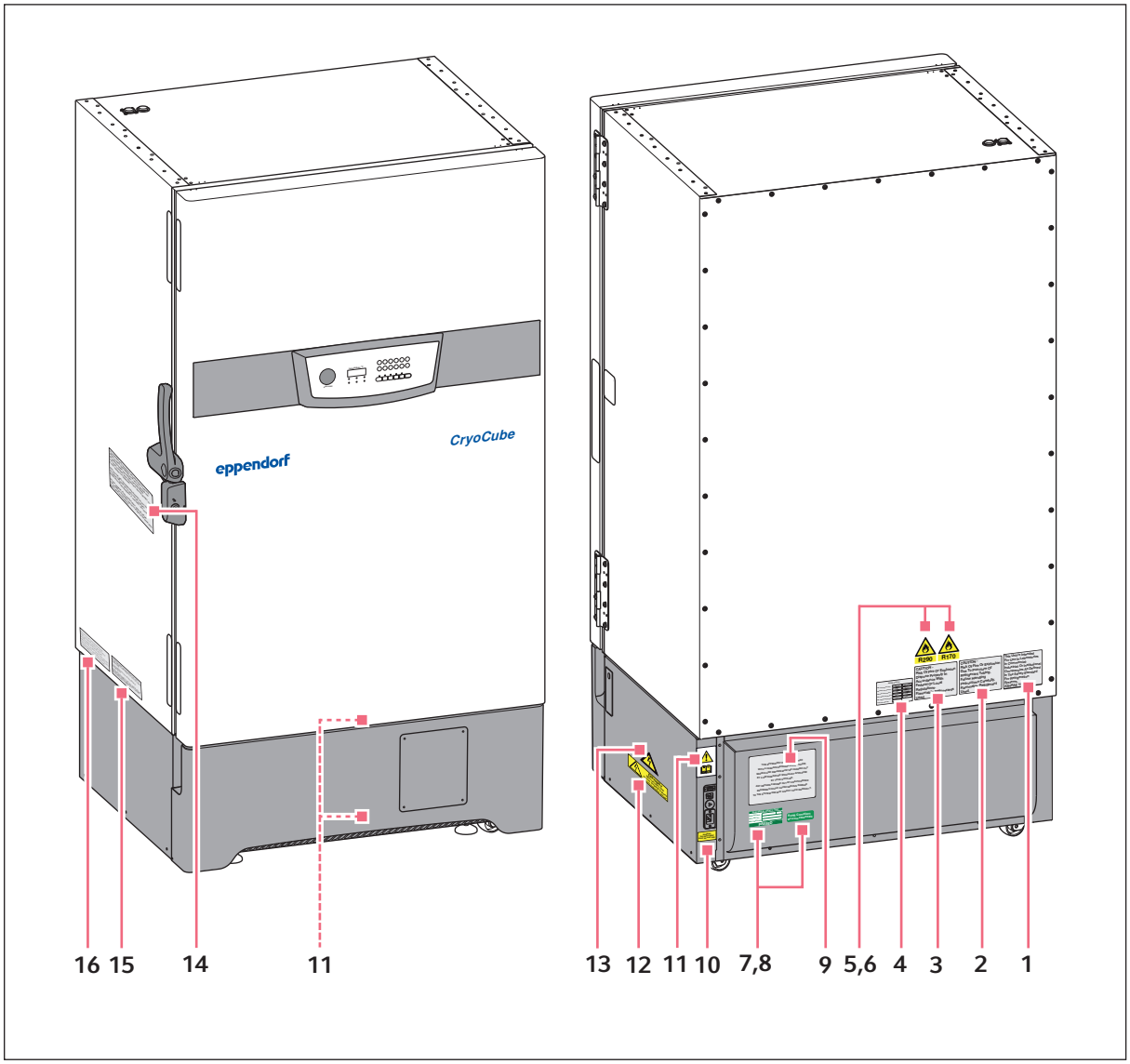
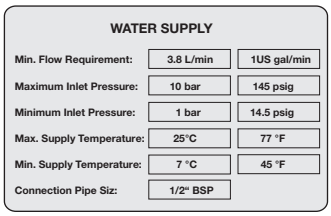
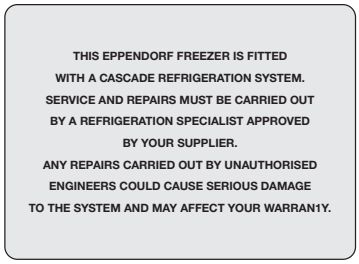


Fig. 2-1: Warning symbols on the outside of the device

	Warning symbol	Meaning
1	**This Unit Is Intended For Use In Laboratories In Commercial, Industrial, Or Institutional Occupancies As Defined In The Safety Standard For Refrigeration Systems, ASHRAE 15**	The device is intended for use in laboratories, industry or institutes as defined by the safety standards for refrigeration systems (ASHRAE 15).
2	**CAUTION - Risk Of Fire Or Explosion Due To Puncture Of Refrigerant Tubing. Follow Handling Instructions Carefully. Flammable Refrigerant Used.**	Notice Risk of fire or explosion due to puncturing of refrigerant tubing. Follow instructions carefully. The device contains flammable refrigerant.
3	**CAUTION - Risk Of Fire Or Explosion Dispose Properly In Accordance With Federal Or Local Regulations. Flammable Refrigerants Used.**	Notice Risk of fire or explosion. Dispose of the device in accordance with federal or local laws and regulations. The device contains flammable refrigerant.
4		CryoCube F740hiw and CryoCube F740iw: information on the water supply.
5		CryoCube F740hi and CryoCube F740hiw: Danger from combustible refrigerant R-170.

	Warning symbol	Meaning
6		CryoCube F740hi and CryoCube F740hiw: Danger from combustible refrigerant R-290.
7		The device has passed the electrical safety test.
8		The device complies with the RoHS Directive 2002/95/EC.
9		The device may only be serviced and repaired by a qualified refrigeration specialist who has been authorized by Eppendorf AG. If the device is serviced or repaired by an unauthorized person, liability on the part of Eppendorf AG shall cease immediately.
10		Only connect the device to a mains/power connection with PE conductor.
11		Notice of a hazard point. Read the operating manual.
12		Risk of electric shock. Disconnect the mains/power cord from the voltage supply before removing the cover.

	Warning symbol	Meaning
13		Electric shock
14	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) 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. 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 to 2 hours. The formation of ice in the seal can damage the seal and hinges. To avoid damage, clean the seal to remove ice.
15	THIS DEVICE COMPLIES WITH PART15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION	The device complies with the *FCC Rules Part 15*. The device may be operated under the following conditions: • This device may not cause harmful interference. • This device must accept any interference received. This includes interference that may cause undesired operation.
16	[EN] Foam blown with fluorinated greenhouse gases. [FR] Mousse soufflée avec des gaz à effet de serre fluorés. [DE] Schaumisolation enthält fluoriertes Treibmittel. [ES] Espuma fundida con gases fluorados de efecto invernadero. [P1] Espuma soprada com gases fluorados com efeito de estufa. [IT] Schiuma soffiato con i gas fluorurati ad effetto serra.	Foam blown with fluorinated greenhouse gases.

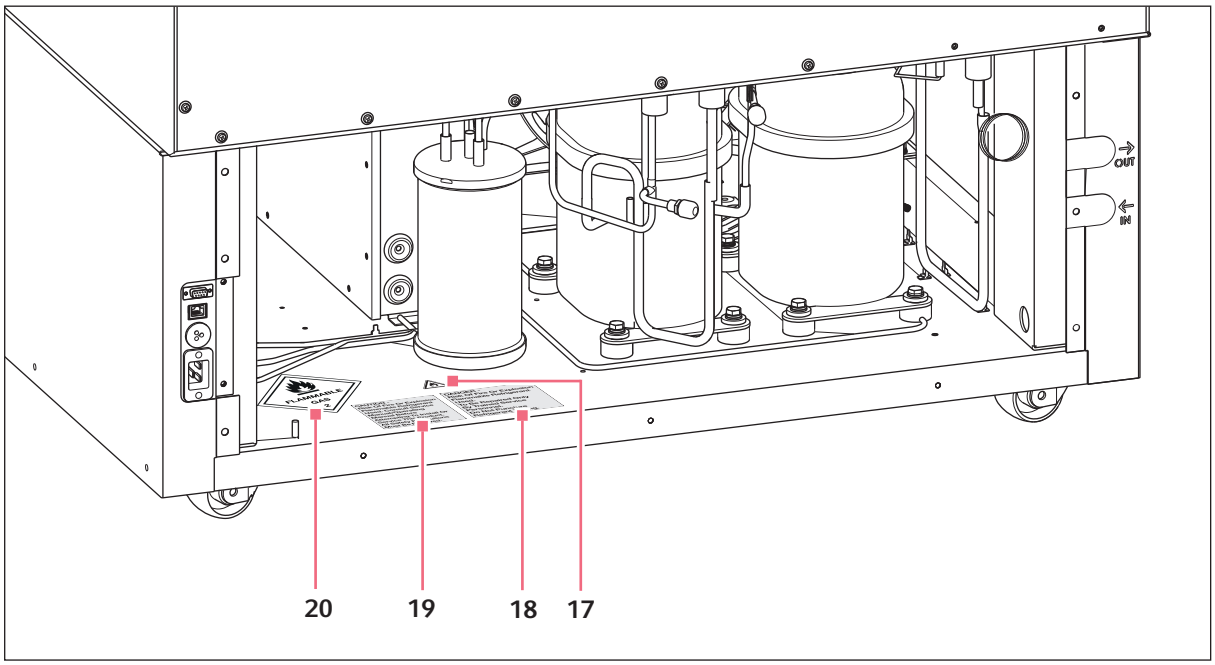


Fig. 2-2: Warning symbols on the rear of the opened device

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

	Warning symbol	Meaning
17	**DANGER - Risk Of Fire Or Explosion Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing.**	Danger Risk of fire or explosion The device contains flammable refrigerant. Only qualified service technicians are allowed to repair the device. Do not puncture the refrigerant tubing.
18	**CAUTION - Risk Of Fire Or Explosion Flammable Refrigerant Used. Consult Service Manual/Operating Manual Before Attempting To Install Or Service This Product. All Safety Precautions Must Be Followed.**	Notice Risk of fire or explosion The device contains flammable refrigerant. Read the service manual/operating manual before servicing or repairing the device. All safety precautions must be followed.

	Warning symbol	Meaning
19		Danger due to flammable materials
20		Danger due to flammable gas, class 2

3 Product description
3.1 Product overview
3.1.1 Front view

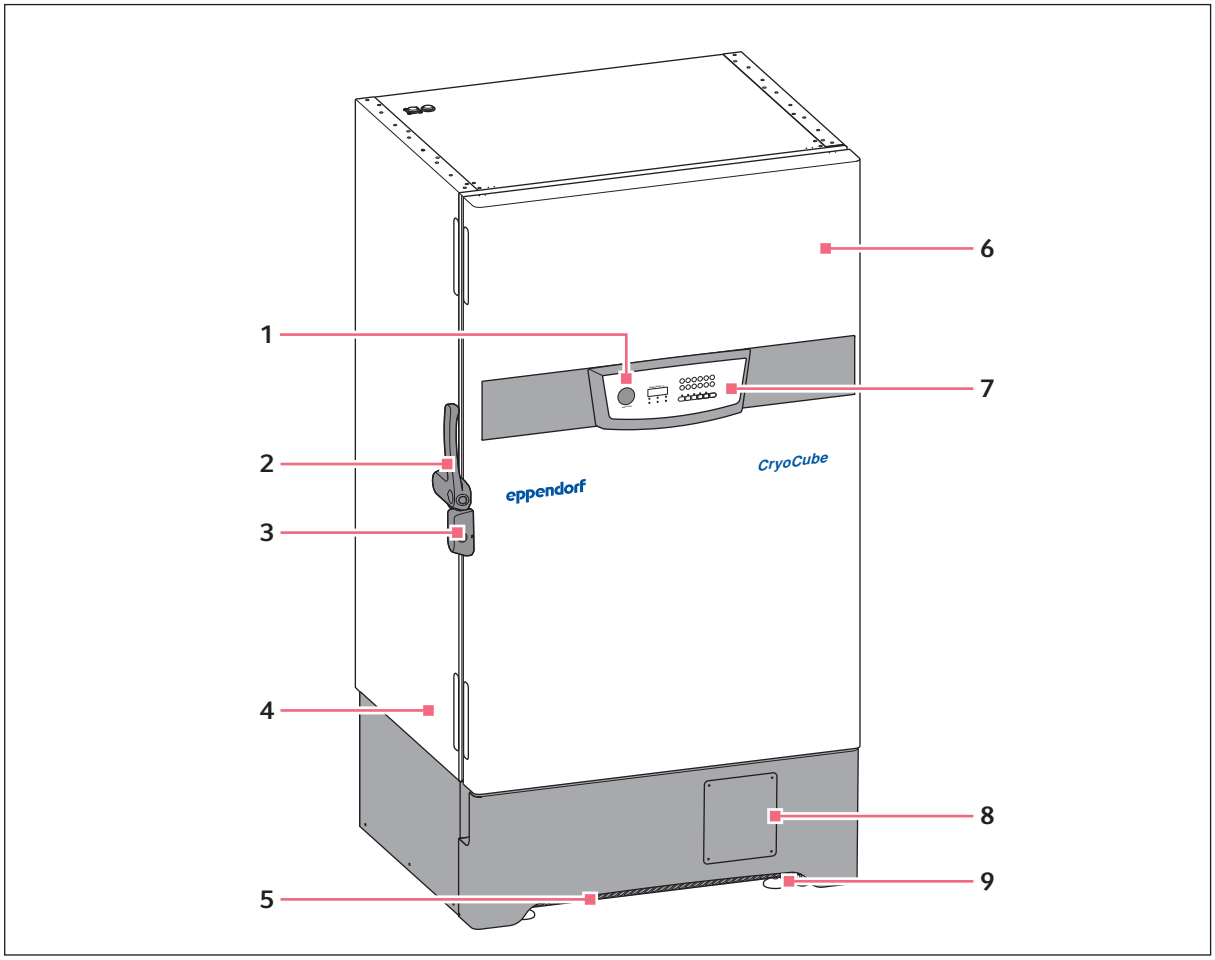


Fig. 3-1: Front view of a model with the door handle mounted on the left side

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

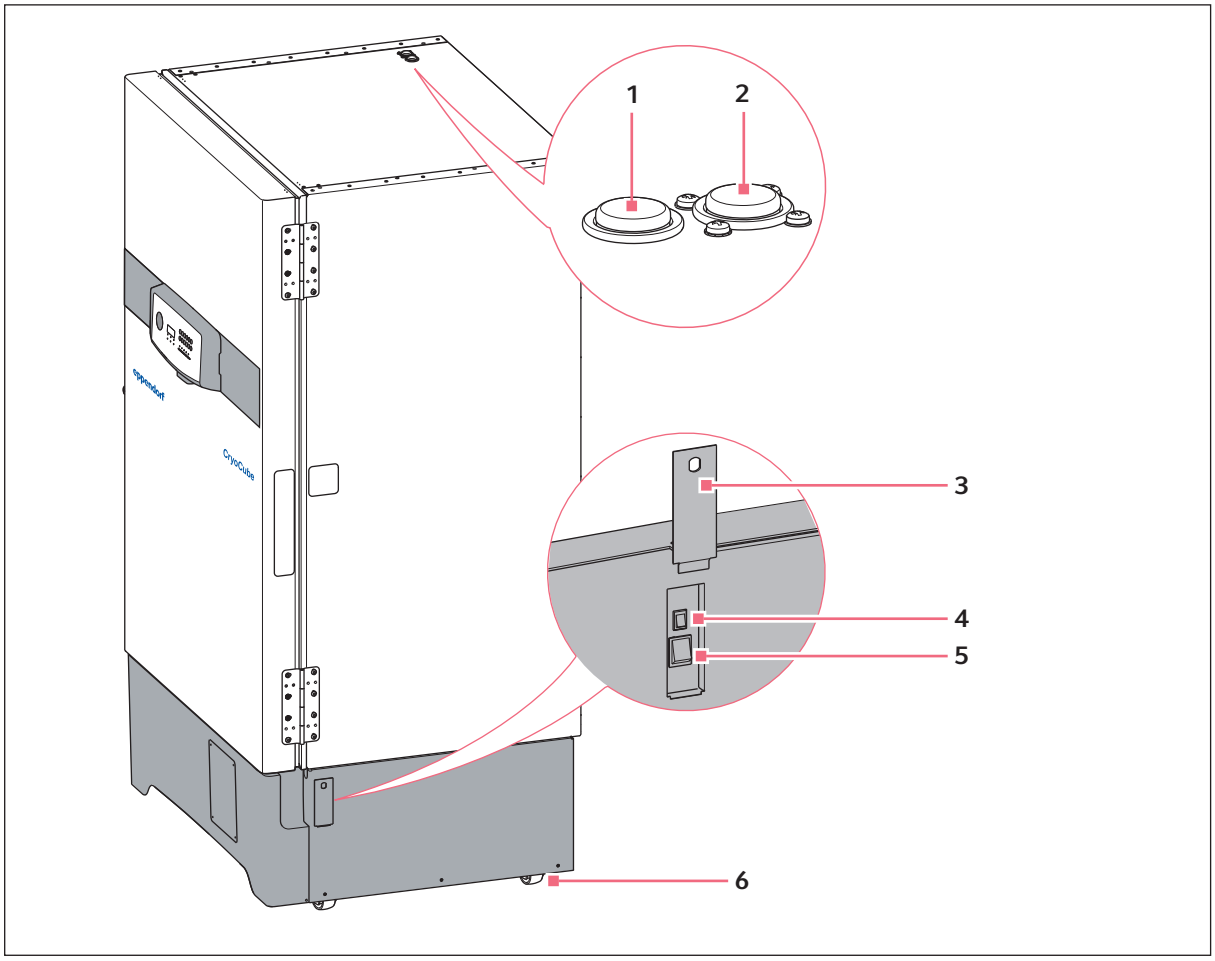


Fig. 3-2: Side view

1 **Access port**
For external sensors

2 **Access port**
For external sensors or an 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

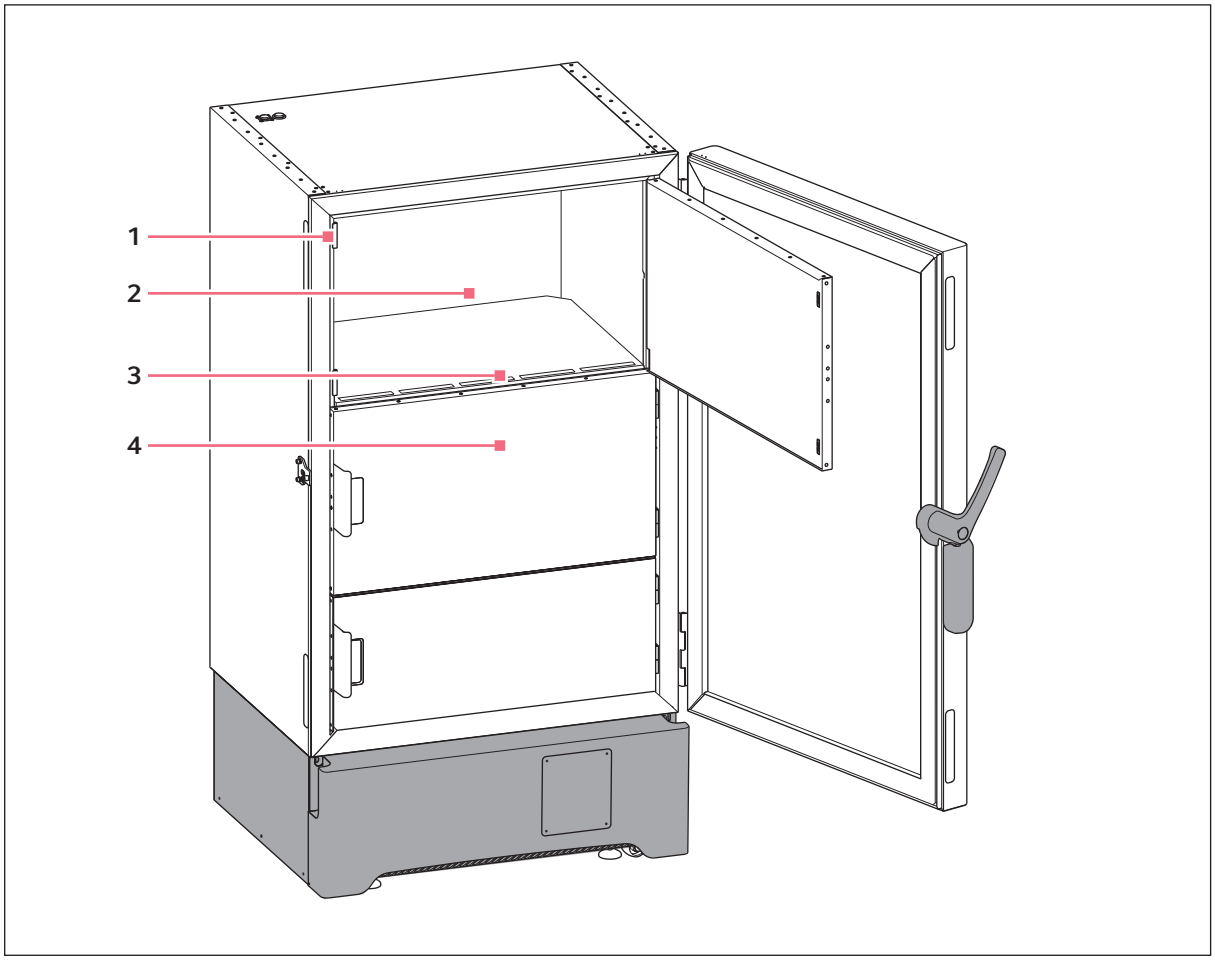


Fig. 3-3: Internal view of a model with three inner doors

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

3.1.4 Interfaces

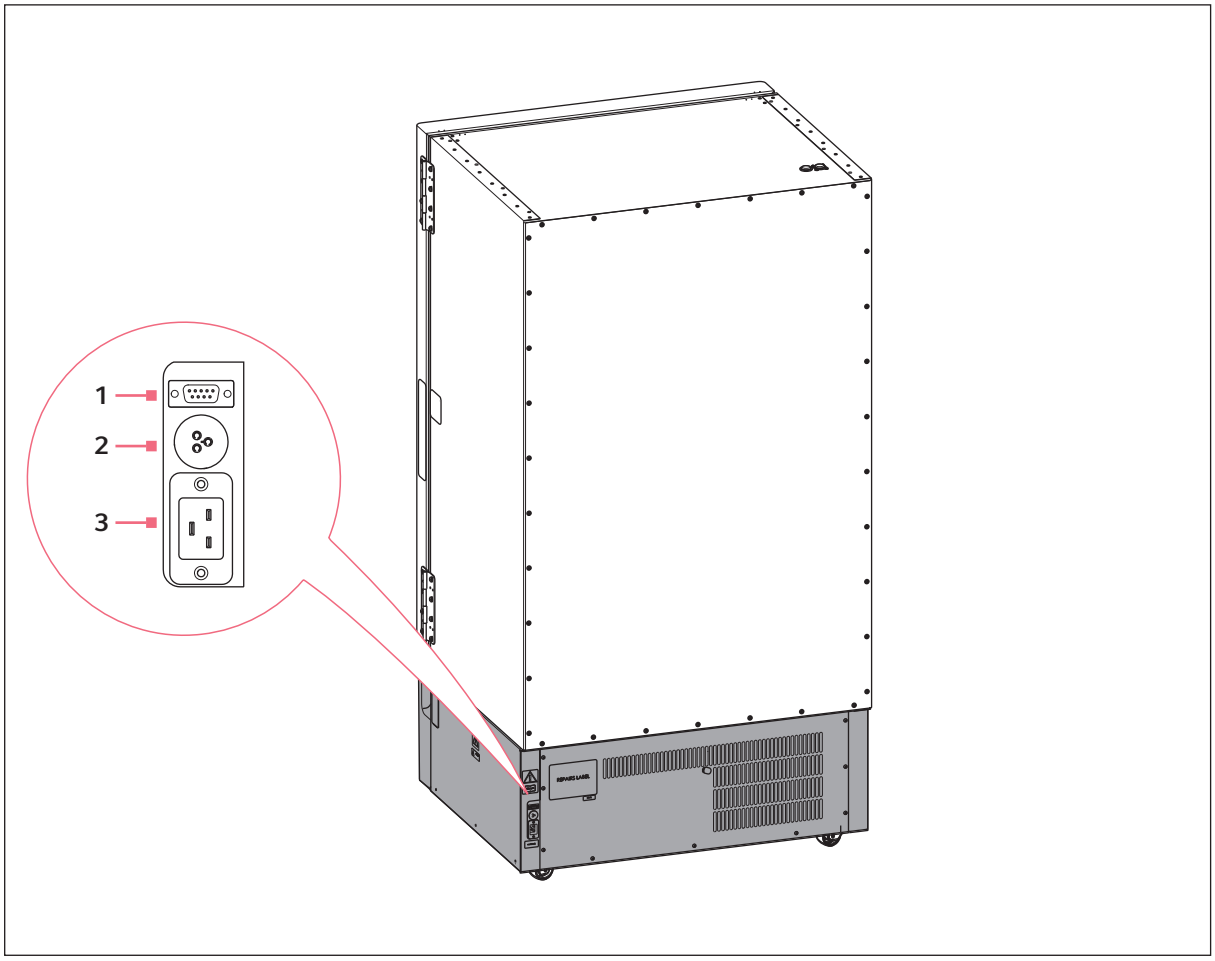


Fig. 3-4: Rear view

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 devices which comply with the standards IEC 950/EN 60950-1 (UL 1950) may be connected 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 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. Automatic 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 device is 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.

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

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 CryoCube F740 models

Alignment of the door handle	Number of compartments	Cooling	Voltage
Left	3	Air cooling	100 V – 230 V
Left	5	Air cooling	100 V – 230 V
Right	3	Air cooling	100 V – 230 V
Right	5	Air cooling	100 V – 230 V

3.4 Alarms and warnings

3.4.1 Alarms

Alarms consist of a message on the control panel, an indicator light, an audible local alarm and forwarding of the alarm to an external monitoring system and a building management system.

You can define alarm limits. If the measured value of a function exceeds the alarm limit, the alarm will be triggered.

If you do not want an alarm to be triggered immediately, you can define a delay time. The alarm will only be triggered if the measured value still exceeds the alarm limit after the delay time has elapsed.

Example: You open the outer door for a longer time to load the device. The temperature inside the device increases. The alarm limit for the interior temperature is exceeded. If you have defined a delay time, the alarm will not be triggered immediately. It will only be triggered if the interior temperature still exceeds the alarm limit after the delay time has elapsed.

The indicator light will go out after the cause of the alarm has been resolved. The audible alarm stops. The message is no longer displayed.

Alarm: interior temperature too high

- The interior temperature exceeds the alarm limit.
- The alarm is triggered after the delay time has elapsed. The delay time can be defined.
- The **temp alarm** indicator light glows.
- The audible alarm sounds on the device.
- The alarm is forwarded to an external monitoring system and a building management system via the serial interface and the remote alarm interface.

Alarm: interior temperature too low

- The interior temperature has fallen below the alarm limit.
- The alarm is triggered after the delay time has elapsed. The delay time can be defined.
- The **temp alarm** indicator light glows.
- The audible alarm sounds on the device.
- The alarm is forwarded to an external monitoring system and a building management system via the serial interface and the remote alarm interface.

Mains/power outage

- The mains/power supply to the device is interrupted.
- If the mains/power supply is interrupted, the battery back-up is switched on. The battery back-up circuit will trigger the alarm.
- The **power fail** indicator light glows.
  The display shows the interior temperature and flashes at intervals of 10 s.
- The audible alarm sounds on the device.
- The alarm is forwarded to an external monitoring system and a building management system via the serial interface and the remote alarm interface.
- The alarm is always active.

Low battery
- The battery voltage is too low.
- The **battery-low** indicator light glows.
- The alarm is always active.

System error
- The **fault** indicator light glows.
- The audible alarm sounds on the device.
- The alarm is always active.

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 can be activated and deactivated.

If an alarm is triggered, the audible alarm can be switched off by pressing the **alarm test mute** softkey. The audible alarm will sound again after the delay time has elapsed.

3.5 Delivery package

3.5.1 Device and accessories

Quantity	Description
1	ULT upright freezer
1	Mains/power cord
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 Temperature monitoring system

A temperature monitoring system enables you to monitor the device independently. Interior temperature, ambient temperature and alarms of the device are stored on a central server. You can access the data at any time over the Internet.

Temperature monitoring system functions
- Electronic chart recorder
- Device alarm messages are sent to a monitoring center.
- The monitoring center informs defined people.

The temperature monitoring system can be connected through the access port.

3.6.3 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.

3.6.4 Racks

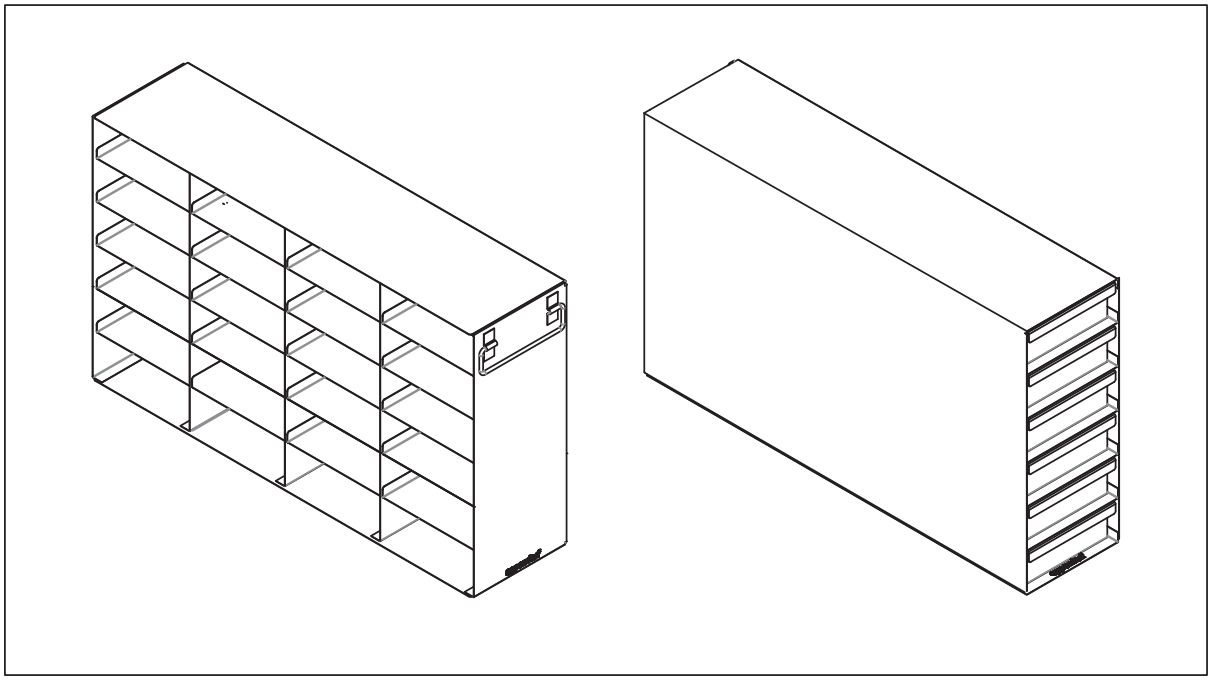


Fig. 3-5: Rack with open sides, rack with drawers

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.

Racks are made of stainless steel or aluminum.

3.6.5 Cardboard boxes and box dividers

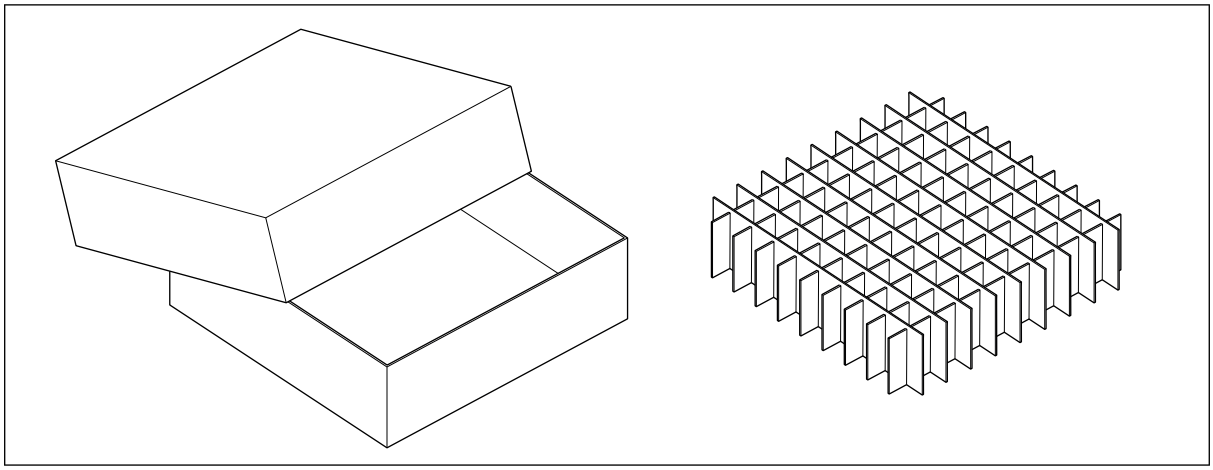


Fig. 3-6: Cardboard box and box divider

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.

3.6.6 Eppendorf Storage Box

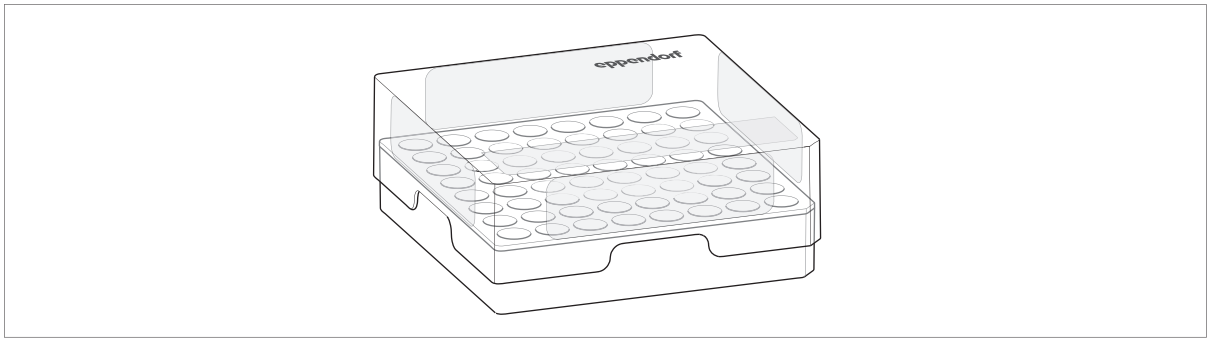


Fig. 3-7: Eppendorf Storage Box

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

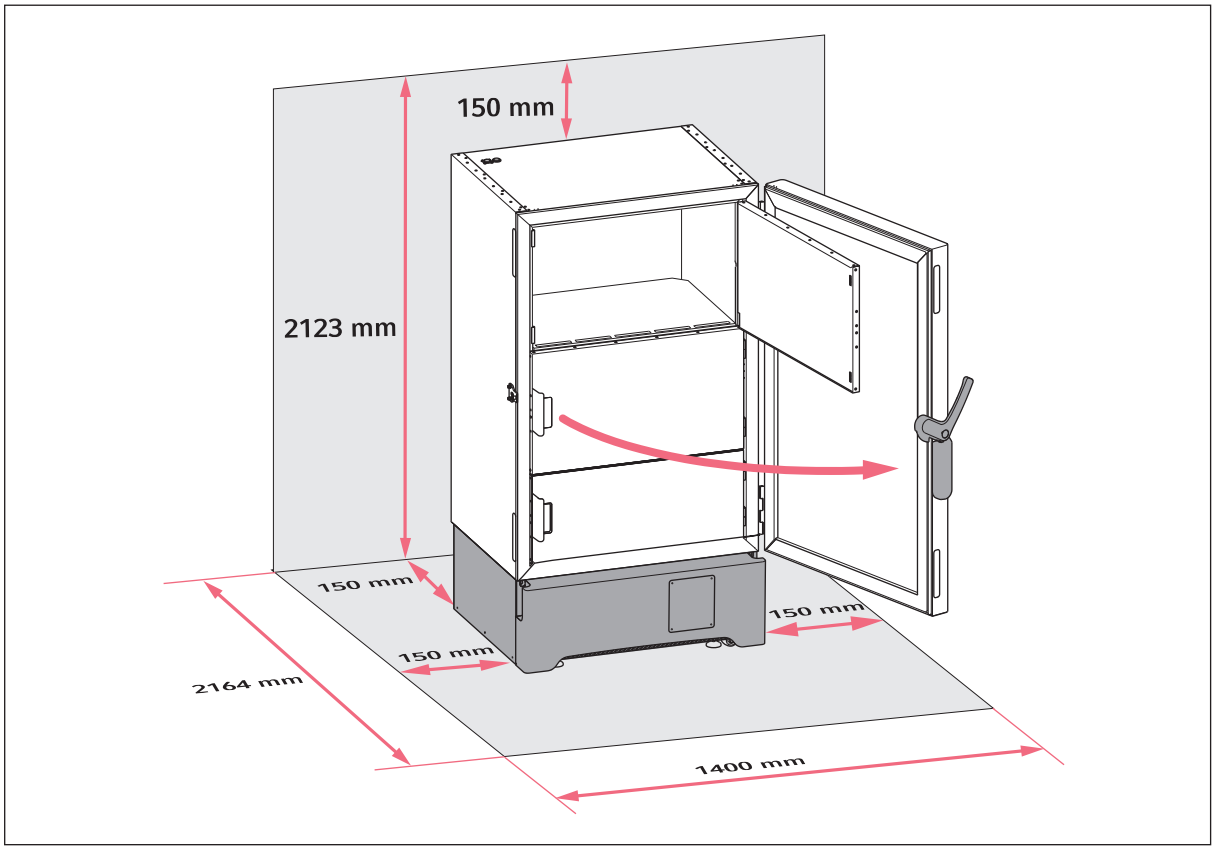


Fig. 4-1: Footprint

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

Electrical connections

- 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.

Location in general

- The ambient conditions match the specifications set out in the Technical data chapter.
- The location is well ventilated.
- 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.

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

NOTICE! Damage as a result of improper packing.
Eppendorf AG is not liable for any damage caused by improper packing.

- The device may only be stored and transported in its original packaging.

Personal protective equipment
- Protective clothing, safety shoes

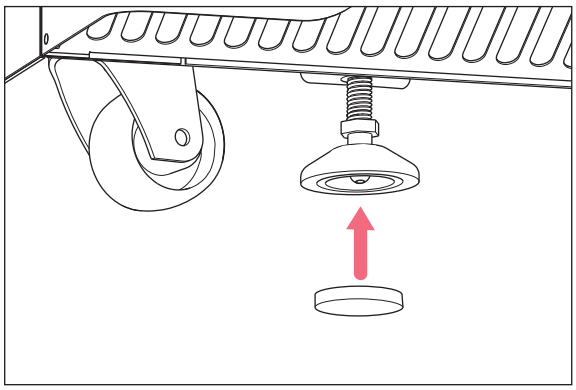
Prerequisites
- The location meets the requirements.

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

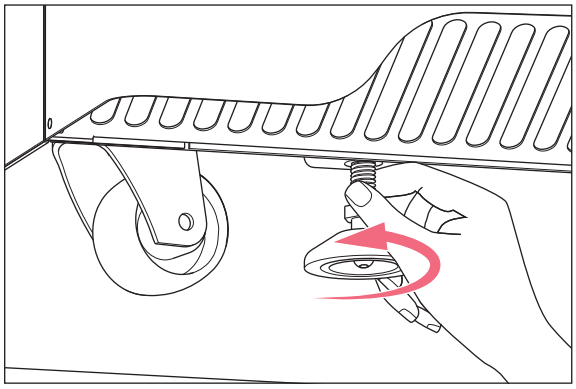
4.2.4 Setting up the device

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.

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.
- Use the supplied mains/power cord only.

Prerequisites

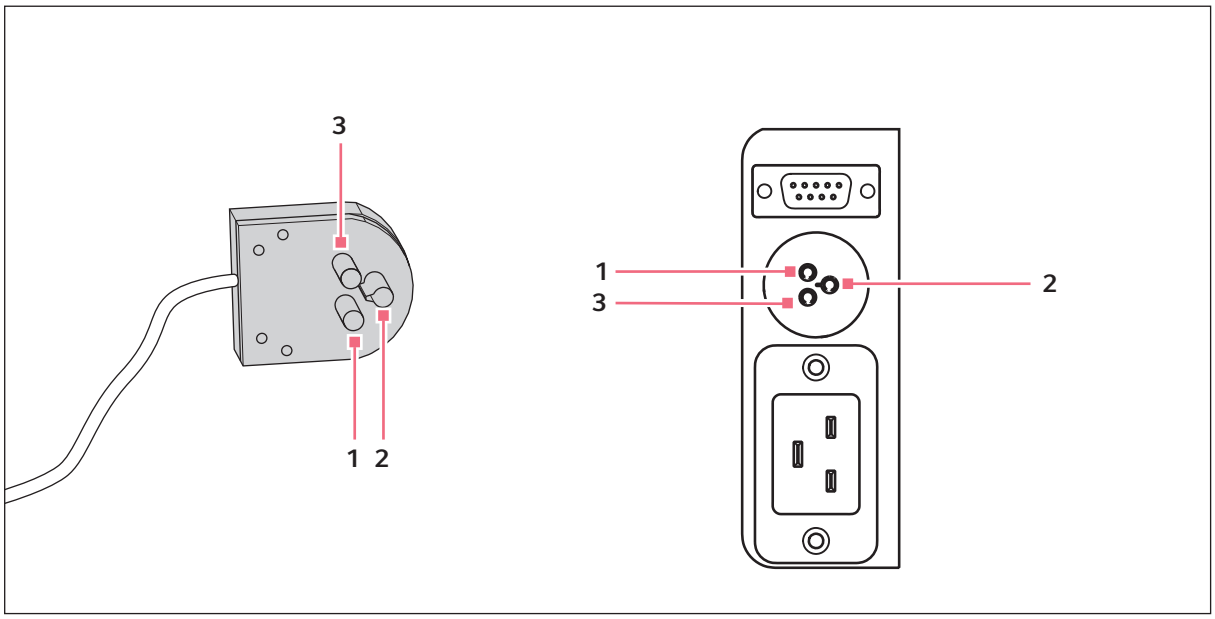
- Mains/power connection in accordance with the name plate

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

2 Pin 2 and socket 2

3 Pin 3 and socket 3

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 Switching the device on

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

- Only switch on the device if the device and the 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).

NOTICE! Damage to electronic components due to condensation.
Condensate can form in the device after it has been moved 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.

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 48 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.

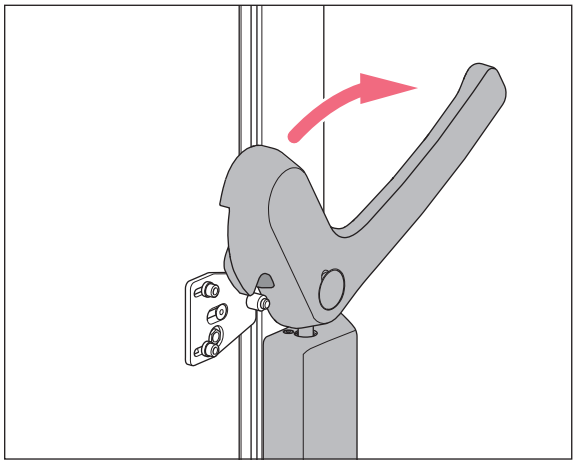
1. Set the desired temperature for the interior of the device.
2. Set the temperature offset.
3. Set alarm limits.
4. Set a delay time for the alarm.
5. Check the alarms.

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 first cooling phase, the pull-down time will be longer. The pull-down time is the time required to cool the interior of the device down from ambient temperature to the set temperature.
The pull-down time specified in the technical data cannot be achieved in this case.

- 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 in the inner compartment.

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.

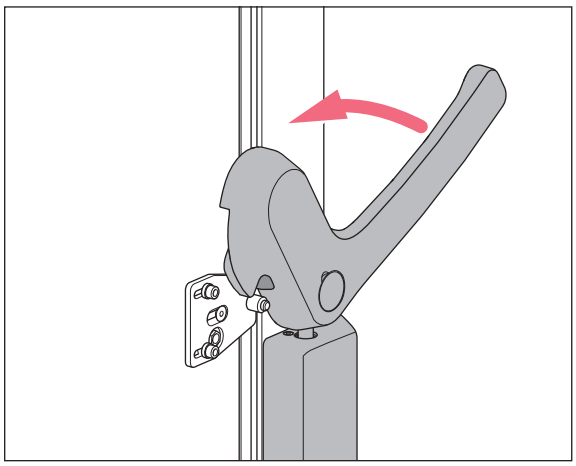
5.3 Close the outer door.

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. To bring the door handle into its original position, pull it 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 the device off

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

- Only switch on the device if the device and the 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 software settings are not saved in the event of a mains/power outage.
- 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

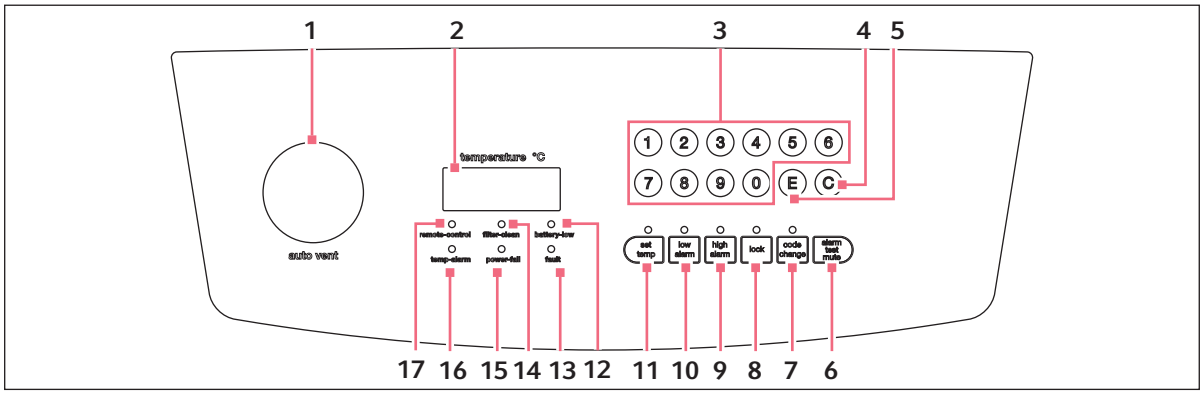


Fig. 6-1: Control panel

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 entry.

6 alarm test mute softkey
Deactivate the audible alarm. Test the audible alarm.

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 audible alarm sounds while the indicator 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 softkey **C**.
  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 for the local alarm, press softkey **8**.
- To display the delay for the remote alarm, press softkey **9**.
  The delay time is displayed.

6.2.5 Displaying the ambient temperature

- Press softkey **0**.
  The ambient temperature is displayed.

6.2.6 Displaying the time for cleaning the air filter

- Press softkey **7**.
  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 of the device

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 softkey **C**.
5. Confirm the entry. To do so, press softkey **E**.
   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 offset for the setpoint temperature in the interior

You can set an offset for the setpoint 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 softkey **C**.
3. Enter the offset using the numerical keys.
   The offset is displayed.
   To deactivate the offset, enter 0.
4. To delete the entry, press softkey **C**.
5. Confirm the entry. To do so, press softkey **E**.
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 softkey **C**.
6. Confirm the entry. To do so, press softkey **E**.
   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 local alarm and the remote alarm.

	Minimum value	Maximum value	Factory setting
Local 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 local alarm, press softkey **8**.
3. To set the delay for the remote alarm, press softkey **9**.
   PP is displayed.
4. Enter the delay time using the numerical keys.
   The delay time is displayed.
5. To delete the entry, press softkey **C**.
6. Confirm the entry. To do so, press softkey **E**.
   --- 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 softkey **C**.
5. Confirm the entry. To do so, press softkey **E**.
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 softkey **7** 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
- Additional ULT freezer to store samples during defrosting
- Material for absorbing the melt water
- "Defrosting device" notice sign

1. Transfer the samples to the additional ULT freezer.
2. Put up the notice sign.
3. Switch off the device and disconnect it from the mains/power line (see p. 37).
4. Open the outer and inner doors.
5. Wait until the ice has melted.
6. Absorb the melt water.
7. Dry the interior of the device.
8. Connect the device to the mains/power line.
9. Put the device into operation.

7.3 Removing the inner shelves from the device

To facilitate cleaning or decontamination of the device, you can remove the inner shelves.

- Lift the inner shelf upwards out of the device.

7.4 Cleaning and decontamination

DANGER! Electric shock.

- Switch off the device and disconnect the power plug before starting maintenance or cleaning work.

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.

7.4.1 Cleaning the device

Tools and auxiliary equipment
- Water
- Mild cleaning agent
- Soft, lint-free cloth
- The inner shelves have been removed.

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

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

7.4.2 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.

7.4.3 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 surface on which the seal rests with a soft, lint-free cloth.

7.4.4 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.

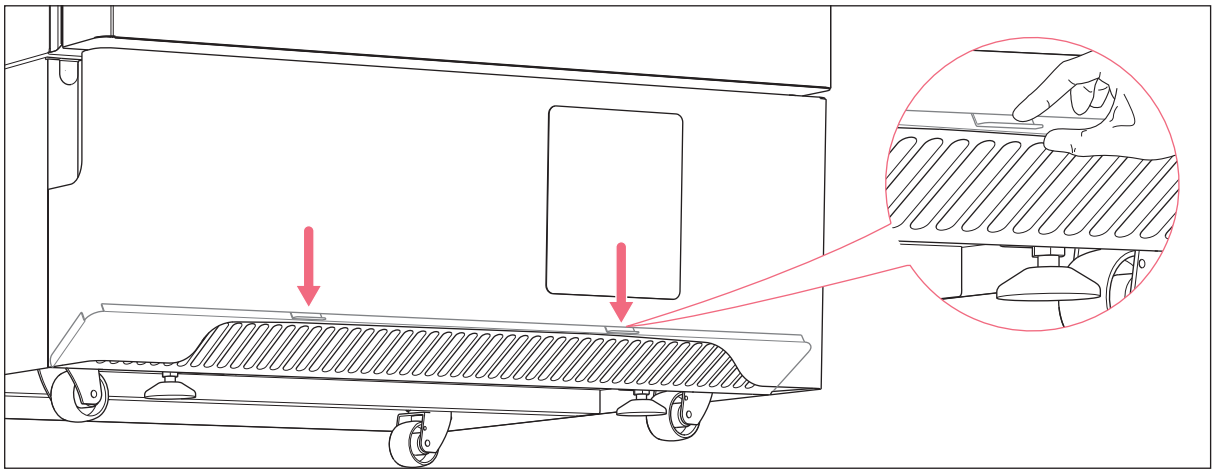


Fig. 7-1: Folding down the air intake grille

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 cycle 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.

7.4.5 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.
- The inner shelves have been removed.

1. Moisten the lint-free cloth with decontamination agent.
2. Clean the surfaces with the lint-free cloth.

   The surfaces are moistened with decontamination agent.
3. Allow the decontamination agent to take effect.
4. Wipe off the decontamination agent with deionized water.
5. Allow the surfaces to dry.

7.5 Fuses

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

7.6 Checking the alarm

7.6.1 Checking indicator lights and the audible alarm

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

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

7.6.2 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 audible alarm 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.

7.7 Shipping the device

DANGER! Risk of injury due to tilting 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! 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 as a result of improper packing.
Eppendorf AG is not liable for damage caused by improper packing.

- The device may only be stored and transported in its original packing.
- If you do not have the original packing, request original packing from Eppendorf AG.

Prerequisites

- 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 packing.
5. Send the device to Eppendorf AG or an authorized service center.

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. ▸ 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 heat exchanger does not work.	▸ Contact your Eppendorf partner.
Code *E-03* The device triggers an alarm.	• The temperature sensor at the condenser does not work.	▸ Contact your Eppendorf partner.
Code *E-04*	• The temperature at the condenser is too high.	▸ Clean the air filter. ▸ Establish an ambient temperature that complies with the technical data. ▸ 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)*.

If the mains/power supply was interrupted only briefly and the interior temperature is below the high alarm limit, the device will continue to operate normally.

If the mains/power supply is interrupted for a longer time, the interior temperature will increase. If the interior temperature rises above the high alarm limit, the **temp alarm** indicator light will light up. If the temperature is still above the high alarm limit after the delay time has elapsed, the device will trigger an "Interior temperature too high" alarm.

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 *Alarms on p. 24)*.

- 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 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 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 can form in the device after it has been moved 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.

9.1.1 Preparing the device for transport

Prerequisites
- Additional ULT freezer to store samples during transport
- Open-end wrench

1. Transfer the racks and samples to the additional ULT freezer.
2. Unlock the switch locking plate and remove the cover.
3. Switch off the battery switch.
4. Switch off the device using the mains/power switch.
5. Disconnect the mains/power cord from the voltage supply.
6. Remove the safety clamp.
7. Remove the mains/power cord from the device.
8. Turn the leveling feet up with the open-end wrench.

9.1.2 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.

9.2 Shut down

1. Switch the device off (see p. 37).
2. Disconnect the device from the voltage supply.
3. Remove the safety clamp of the mains/power cord. Remove the mains/power cord from the device.
4. Defrost the device (see p. 47).
5. Decontaminate the device (see p. 50).

9.3 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

Voltage	100 V – 230 V	
Frequency	50 Hz - 60 Hz	
Current consumption	CryoCube F740(100 V) CryoCube F740(120 V) CryoCube F740(208 V) CryoCube F740(230 V)	15 A 12 A 9 A 6 A
Power consumption The device is empty. The interior temperature is -80 °C. The ambient temperature is 20 °C.	CryoCube F740(100 V): CryoCube F740(115 V): CryoCube F740(208 V): CryoCube F740(230 V):	14.2 kWh/day 14.2 kWh/day 12.9 kWh/day 12.9 kWh/day
Electromagnetic compatibility (EMC)	The device meets the following requirements: • IEC/EN 61326-1 • EN 55011 (CISPR 11) • 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

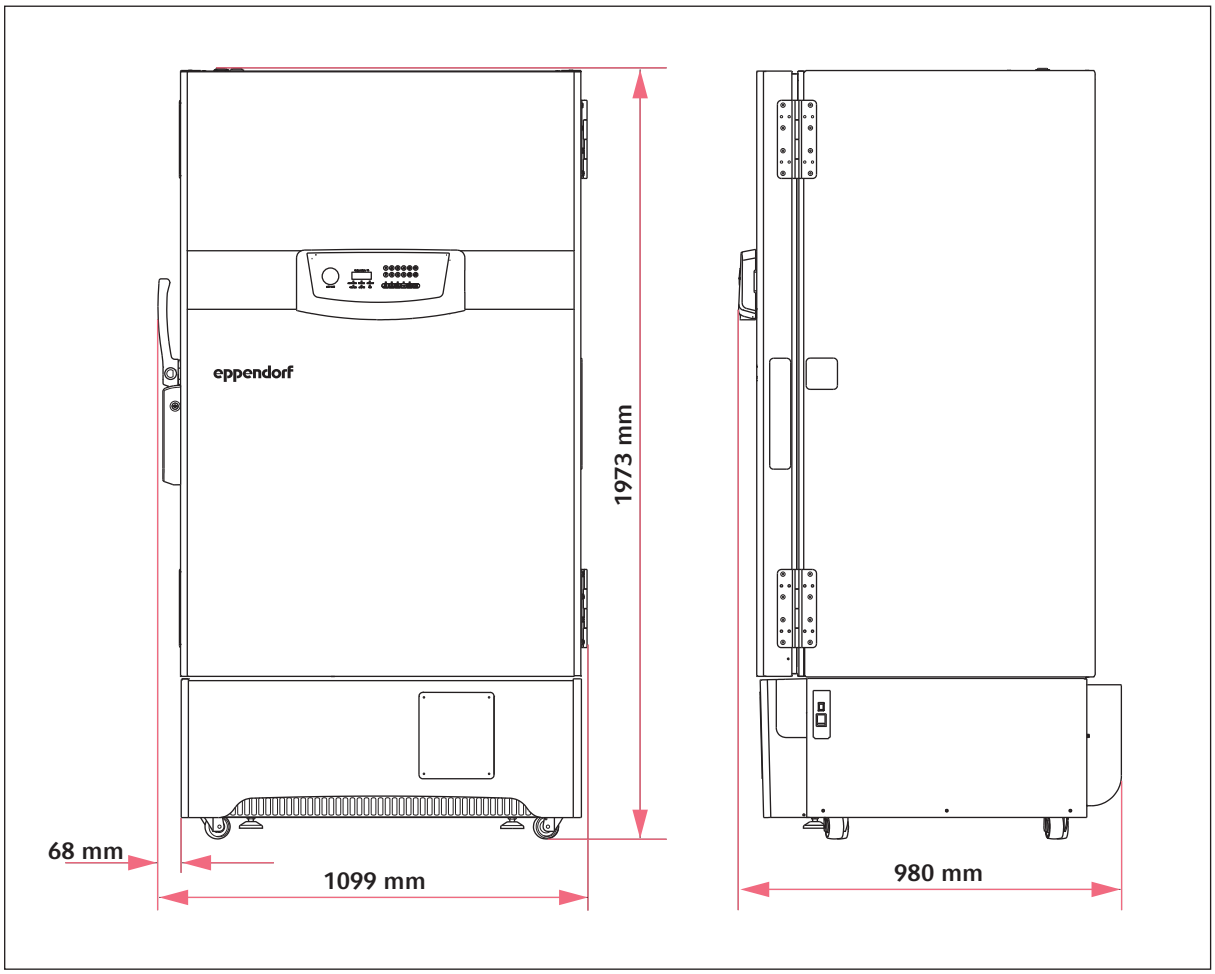
	Air temperature	Relative humidity	Atmospheric pressure
General transport	-20°C – 35°C	10 % – 91 %	30 kPa – 106 kPa
Air freight	-20°C – 35°C	10 % – 91 %	30 kPa – 106 kPa

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

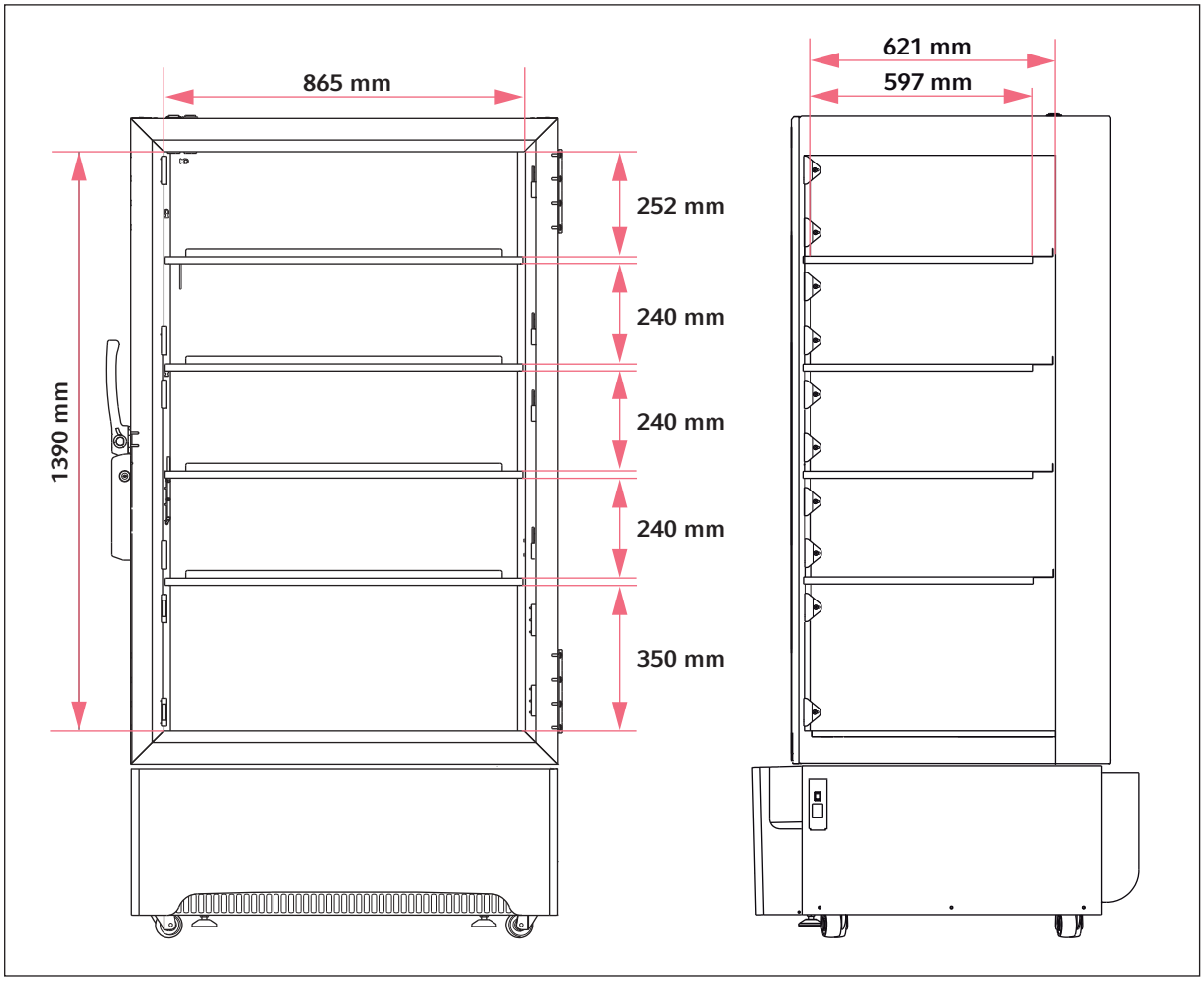


Fig. 10-1: Internal dimensions for devices with 5 inner compartments

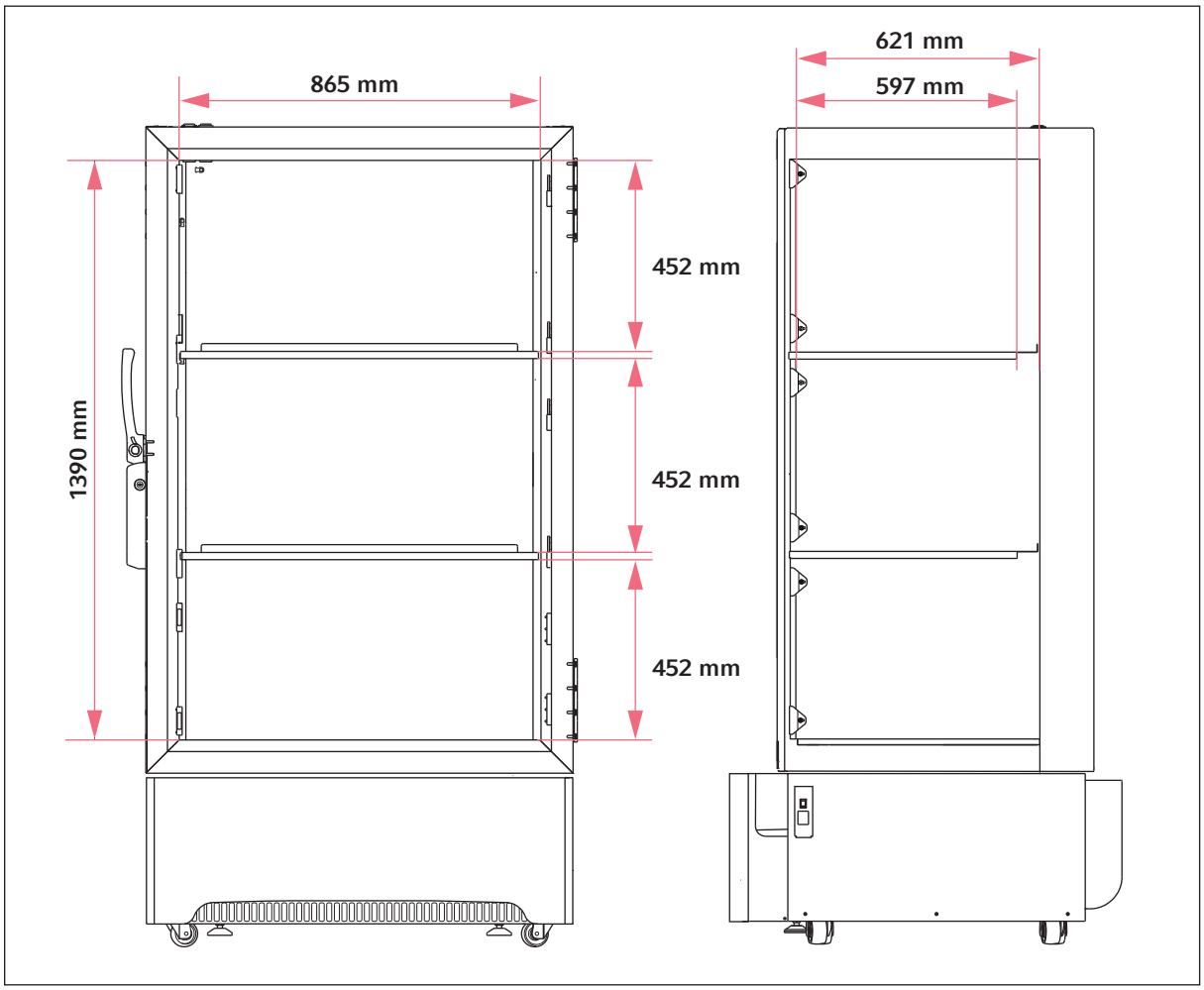


Fig. 10-2: Internal dimensions for devices with 3 inner compartments

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

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

10.5 Noise level

Noise level	47.8 dB (A)

10.6 Interfaces

BMS	Remote alarm
Serial interface	RS-485

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

10.7 Temperature control

10.7.1 Temperature range

Setting range	-50 °C to -86 °C

10.7.2 Times for cooling and heating the interior

Cooling from 22 °C to -80 °C	CryoCube F740 (230 V)	5 h 30 min
Heating from -80 °C to 0 °C The device is 2/3 filled.	CryoCube F740 (230 V)	41 h

10.7.3 Cooling of the refrigeration cycle

CryoCube F740	Air cooling

10.7.4 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)

Refrigerant	**Components**
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 Polyurethane foam
Device insulation	Vacuum insulation panels Polyurethane foam
Interior	Stainless steel (304 2B)

11 Ordering information

11.1 Accessories

11.1.1 Back-up systems

Order no. (International)	Description
	CO2 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 Temperature monitoring systems

Order no. (International)	Description
	Eppendorf TCA-3 Temperature Monitor
P0625-1630	100 V/60 Hz

11.1.3 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

11.1.4 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

11.1.5 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

11.1.6 Eppendorf Storage Boxes

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

Declaration of Conformity

The product named below fulfills the requirements of directives and standards listed. In the case of unauthorized modifications to the product or an unintended use this declaration becomes invalid. This declaration of conformity is issued under the sole responsibility of the manufacturer.

Product name:

CryoCube® F740

including accessories

F740300011 F740300021 F740300031 F740300041

Product type:

Ultra- low temperature freezer

Relevant directives / standards:

2014/35/EU:	EN 61010- 1
	UL 61010- 1, CAN/CSA C22.2 No. 61010- 1
2014/30/EU:	EN 61326- 1
	47 CFR FCC part 15
2011/65/EU:	EN 50581
2014/68/EU:	EN 378- 2 (partial)

Hamburg, May 05, 2017

Dr. Wilhelm Plüster
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