



CryoCube Freezers

Operating manual

Copyright

Copyright © 2015 Eppendorf AG, Germany. No part of this publication may be reproduced without the prior permission of the copyright owner.

The company reserves the right to change information in this document without notice. Updates to information in this document reflect our commitment to continuing product development and improvement.

Trademarks

Eppendorf® and the Eppendorf logo are registered trademarks of Eppendorf AG, Germany.

CryoCube® is a registered trademark of Eppendorf AG, Germany.

HEF® is a registered trademark of Eppendorf, Inc., USA.

BioCommand® is a registered trademark of Eppendorf, Inc., USA.

S.M.A.R.T. Plus™ is a pending trademark of Eppendorf, Inc., USA.

Trademarks are not marked in all cases with ™ or ® in this manual.

Eppendorf has attempted to identify the ownership of all trademarks from public records. Any omissions or errors are unintentional.

Table of contents

1	Operating instructions	7
1.1	Using this manual	7
1.2	Danger symbols and danger levels	7
1.2.1	Hazard symbols	7
1.2.2	Degrees of danger	7
1.3	Symbols used	7
1.4	Abbreviations used	8
2	Safety	9
2.1	Intended use	9
2.2	Warnings for intended use	9
2.2.1	Manual conventions used	9
2.2.2	Health and safety at work act 1974	10
3	Product description	11
3.1	Product overview	11
3.1.1	Keypad Controls	14
3.2	Delivery package	16
3.2.1	Inspection of boxes	16
3.2.2	Packing list verification	16
3.3	Product versions	16
3.4	Features	17
3.4.1	Control panel	17
3.4.2	Security	17
3.4.3	Compressors	17
3.4.4	Vent port	17
3.4.5	Construction	18
3.4.6	Access ports	18
3.4.7	External monitoring	18
3.4.8	Automatic reset	18
3.4.9	Accessories	18
4	Installation	19
4.1	Preparing installation	19
4.2	Selecting the location	19
4.2.1	Occupancy rating (230 V, 50 Hz models only)	19
4.2.2	Below ground installations (230 V, 50 Hz models only)	20
4.2.3	Installation categories (230 V, 50 Hz models only)	20
4.3	Mains/power plugs and sockets	20
4.4	Requirements for water-cooled models	21
4.5	Connecting multiple water-cooled freezers	22
4.5.1	Connecting freezers to a recirculating chiller	22
4.5.2	Connecting freezers to the non-recirculating water supply (no chiller)	23
4.6	Water flow rate	24
4.7	CryoCube F570 and F570h/F570hw shelves	25
4.8	Lockable freezer handle	26

5	Operation	27
5.1	Getting started	27
5.1.1	Plug in	27
5.1.2	Turning the freezer on/off	27
5.1.3	Alarm/battery activation	29
5.1.4	Testing the alarm monitoring socket	30
5.1.5	Vacuum effect	30
5.2	Programming the freezer	30
5.2.1	Setting operating temperature	30
5.2.2	Setting high alarm setpoint	31
5.2.3	Setting low alarm setpoint	31
5.2.4	Checking temperature and alarm setpoint settings	32
5.2.5	Setting the alarm delay	32
5.2.6	Changing lock codes	33
5.2.7	Setting the temperature offset	33
5.3	Battery backup switch	34
5.4	RS-485 connection	34
5.5	Remote alarm socket	34
6	Maintenance	37
6.1	Cleaning	37
6.1.1	Painted surfaces	37
6.1.2	Panels and shelves	37
6.1.3	Air intake grill and filter	37
6.1.4	Electrically-heated automatic vent port	38
6.1.5	Door or lid seal	38
6.2	Routine maintenance	38
6.2.1	Lubrication	38
6.2.2	Defrosting	38
6.2.3	Removing the inner doors (upright models)	39
6.2.4	Replacing the inner door (upright models)	39
6.2.5	Electrical components	40
6.3	Service safety checklist	41
7	Troubleshooting	43
7.1	General errors	43
7.2	Error messages	43
7.3	After a mains/power failure	44
7.4	Interior warming	44
8	Technical data	45
8.1	Power supply	48
8.2	Environmental conditions	48
8.3	Weight/dimensions	49
8.4	Capacity	49
8.5	Compliances	50

9	Ordering information	51
9.1	Accessories	51
9.1.1	TCA-3 temperature monitoring system	51
9.1.2	Temperature probes	51
9.1.3	Validation packages	51
9.1.4	CO ₂ and LN ₂ back-up systems	51
9.1.5	Inventory racking systems	52
9.1.6	Chart recorder	52
9.1.7	Eppendorf BioCommand SFI datalogging software (RS-485 interface)	52
10	Transport, storage and disposal	53
10.1	Shut down	53
10.2	Transport	53
10.3	Disposal	54
	Index	55
	Certificates	57







1 Operating instructions

1.1 Using this manual

- ▶ Read this operating manual completely 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. Thus, it must always be 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 www.eppendorf.com.

1.2 Danger symbols and danger levels

1.2.1 Hazard symbols


	Hazard point		Freezer burn
	Electric shock		Material damage
	Crush		Flammable

1.2.2 Degrees of danger

The following degree levels are used in safety messages throughout this manual. Acquaint yourself with each item and the potential risk if you disregard the safety message.

DANGER	<i>Will</i> lead to severe injuries or death.
WARNING	<i>May</i> lead to severe injuries or death.
CAUTION	May lead to light to moderate injuries.
NOTICE	May lead to material damage.

1.3 Symbols used

Example	Meaning
▶	You are requested to perform an action.
1. 2.	Perform these actions in the sequence described.
•	List.
	References useful information.

1.4 Abbreviations used

A

Amp

Ah

Ampere-hour

CFC

Chlorofluorocarbons

°C

Degree Celsius

HC

Hydrocarbon

HCFC

Hydrochlorofluorocarbon

Hz

Hertz

kg

Kilogram

lb

Pound

m

Meter

min

Minute

mm

Millimeter

N/A

Not applicable

rpm

Revolutions per Minute (min^{-1})

ULT

Ultra-Low Temperature

V

Volt

2 Safety

2.1 Intended use

CryoCube® freezers are designed to provide precise, ultra-low temperature environments for storage of scientific materials for research purposes. They are designed to provide ultra-low temperature sample storage from -50 °C to -86 °C at 32 °C maximum ambient operating temperature.

2.2 Warnings for intended use

2.2.1 Manual conventions used



WARNING! Risk of personal injury

- ▶ BEFORE connecting the freezer to the mains/power supply, make sure that the mains/power supply matches the requirements of the equipment. Check the specification plate (located on the side of the freezer) for the electrical requirements. The equipment should be connected to an earth/grounded socket.



WARNING! Risk of personal injury

- ▶ Flammable warning messages alert you to possible risks of personal injury and equipment damage: protect the system from sparks and flames.



CAUTION! Risk of personal injury

- ▶ Use freezer gloves at all times when loading or unloading the equipment. The temperature of operation is such that direct contact with the cold contents or inside the equipment can burn unprotected skin.



CAUTION! Risk of personal injury

- ▶ Do not use this equipment in a hazardous atmosphere or with hazardous materials for which the equipment was not designed.
- ▶ Please read the entire operating manual before attempting to use this equipment. If operational guidelines are not followed, personal injury may occur.



CAUTION! Risk of personal injury

- ▶ Crush Warning messages alert you to specific procedures or practices regarding heavy objects which, if not followed correctly, could result in serious personal injury.



NOTICE! Risk of material damage

- ▶ This equipment must be operated as described in this manual.
- ▶ Please read the entire operating manual before attempting to use this equipment. If operational guidelines are not followed, equipment damage may occur.

2.2.2 Health and safety at work act 1974

(FOR THE UNITED KINGDOM)

Eppendorf, as manufacturers and suppliers of laboratory equipment, are obliged under the terms of the above Act to provide our users with instructions on the safe installation, operation and maintenance of our equipment.

Our equipment is designed to acceptable standards and does not entail any hazard if used, as advised in the attached instructions.

The following safety precautions should be observed by all personnel using this equipment:

1. Read and understand this manual. If in doubt, contact your local Eppendorf sales office.
2. Do not remove any covers. There are no operable controls other than those referred to in this manual. There are voltages in excess of 41.5 volts AC behind the covers.
3. Observe good housekeeping practices, at all times keeping the equipment and the adjacent areas clean, dry and uncluttered.
4. Should any malfunctions occur or be suspected, immediately call a qualified service engineer to investigate.
5. The hydrocarbon (Group A3) refrigerants used in these freezers are flammable and therefore appropriate attention must be paid to avoid leaks and to keep the freezer away from sparks and flames.

Any person involved with working on or entering the refrigeration circuit should hold a current and valid certificate from an industry-accredited assessment authority which authorizes his/her competence to handle refrigerants (including hydrocarbons) safely in accordance with local regulations and legislation.

3 Product description

3.1 Product overview

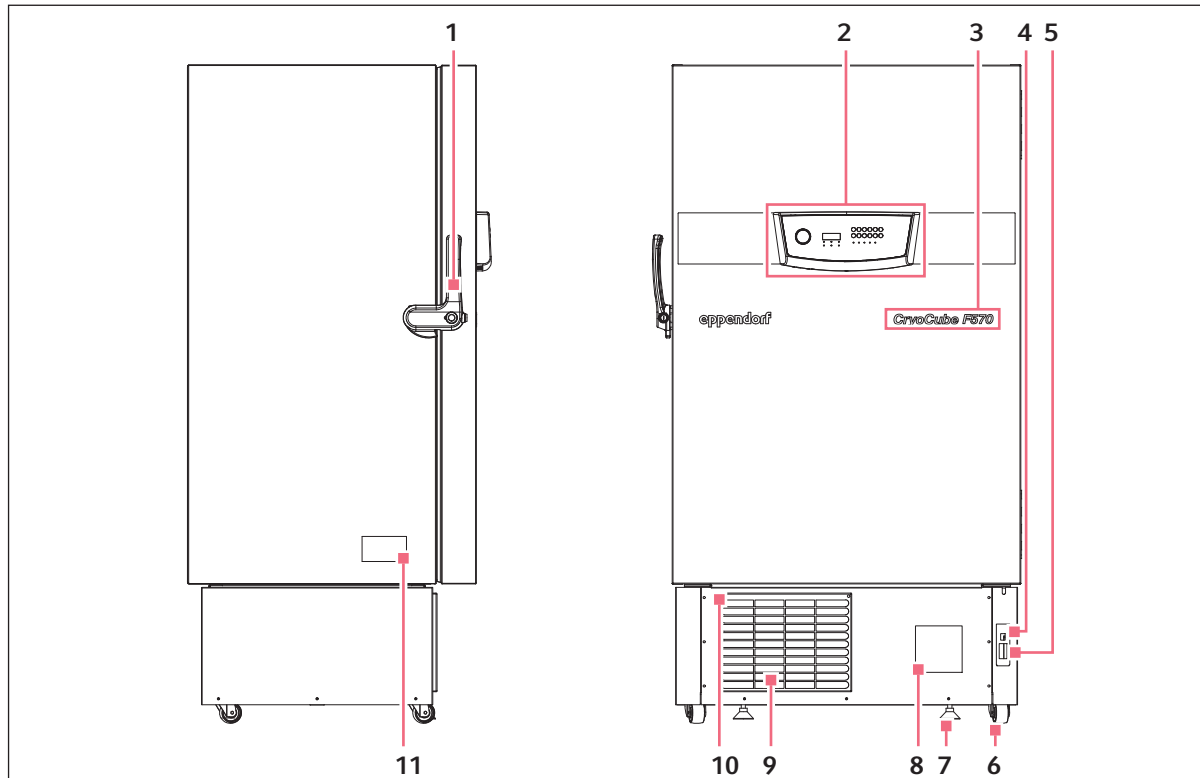


Fig. 3-1: CryoCube upright freezer side and front views

- | | |
|--|-------------------------------------|
| 1 Lockable door handle | 7 Adjustable leveling feet |
| 2 Control panel and display | 8 Chart recorder
Optional |
| 3 Model label | 9 Air filter grill |
| 4 Battery switch
Behind lockable panel | 10 Quarter turn fastener |
| 5 On/off circuit breaker
Behind lockable panel | 11 Specification plate |
| 6 Transport castors | |

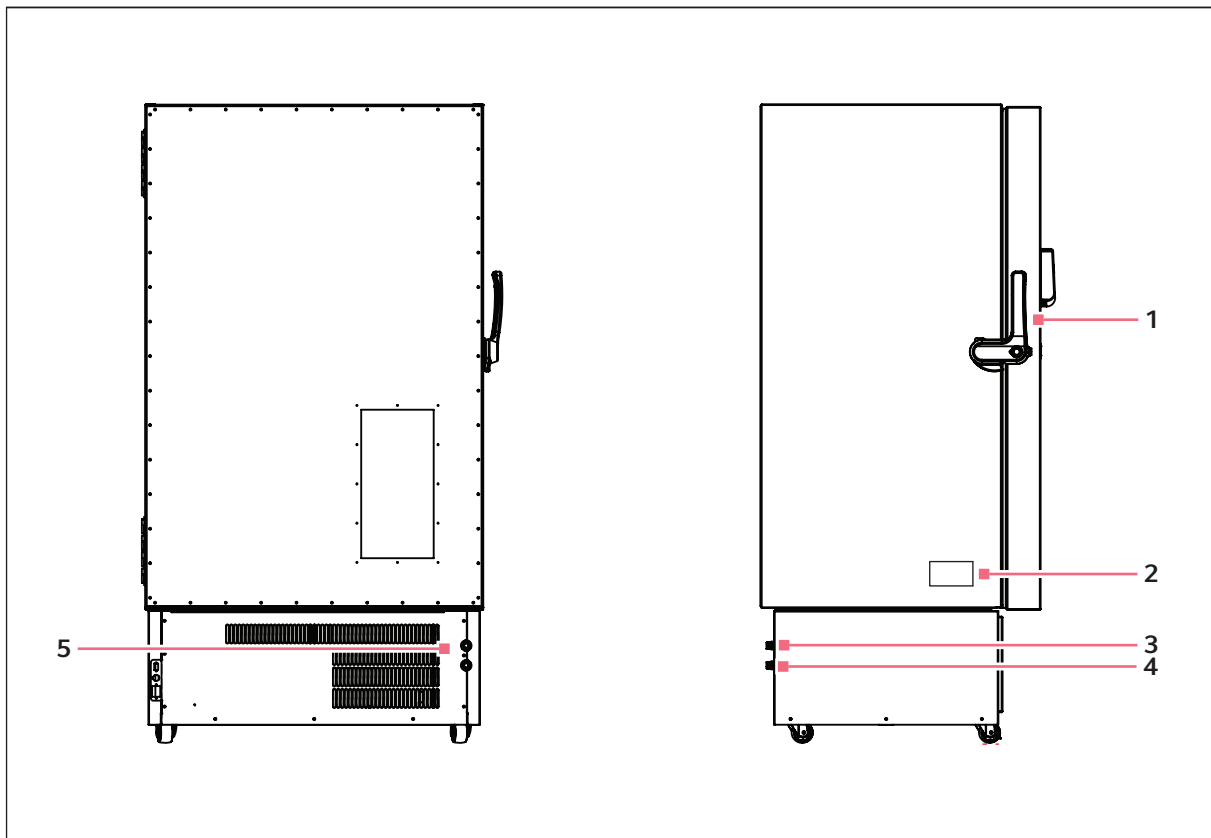


Fig. 3-2: CryoCube water-cooled freezer rear and side views

1 Door handle (lockable)

2 Specification plate

3 Water out

4 Water in

5 Water connection (1/2" BSP)

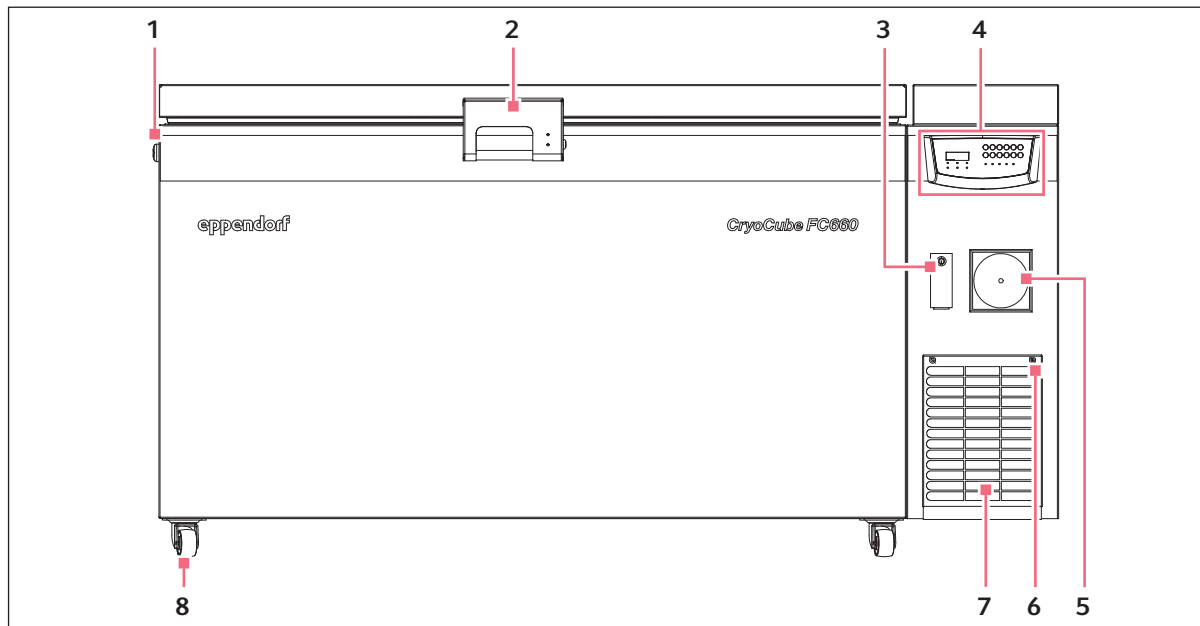


Fig. 3-3: CryoCube chest freezer side and front views

- | | |
|---|-------------------------------------|
| 1 Heated vent port | 5 Chart recorder
Optional |
| 2 Lockable handle | 6 Quarter turn fasteners |
| 3 Battery switch and on/off circuit breaker
Behind lockable panel | 7 Air filter grill |
| 4 Control panel and display | 8 Braked castors
Front |

3.1.1 Keypad Controls

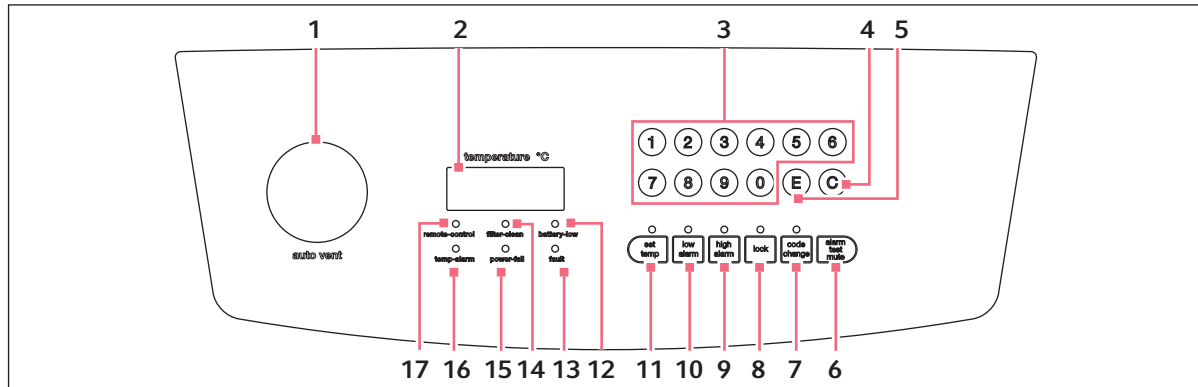


Fig. 3-4: CryoCube upright freezer display panel and keypad

1 Auto vent

2 Temperature

Displays current freezer temperature in 1 °C increments

3 Numerical keys

1 – 10

4 C key

Used to clear data

5 E key

Used to enter data

6 Alarm test/mute key

Sounds the audible alarm
Mutes the audible alarm if an alarm condition occurs

7 Code change key

Used to change freezer lock codes

8 Lock key

Locks and unlocks the control panel for programming

9 High alarm key

Displays current high alarms
Used to program high alarms

10 Low alarm key

Displays current low alarms
Used to program low alarm

11 Set temperature key

Displays current temperature setting
Used to change temperature settings

12 Battery low indicator

If power is on, illuminates when battery voltage is below 5.6 V and flashes if below 5 V
If power is off, extinguishes if battery voltage is below 5.5 V

13 Fault indicator

Illuminates if there is a system fault within the freezer

14 Filter clean indicator

Illuminates to indicate a blocked or dirty filter
Audible alarm will sound when indicator is flashing

15 Power fail indicator

Flashes to indicate mains/power failure
Audible alarm will sound when indicator is flashing

16 Temperature alarm indicator

Illuminates when setpoint is passed

17 Remote control indicator

Illuminates when freezer is operating under remote computer control via RS-485 and BioCommand® SFI or other laboratory logging software

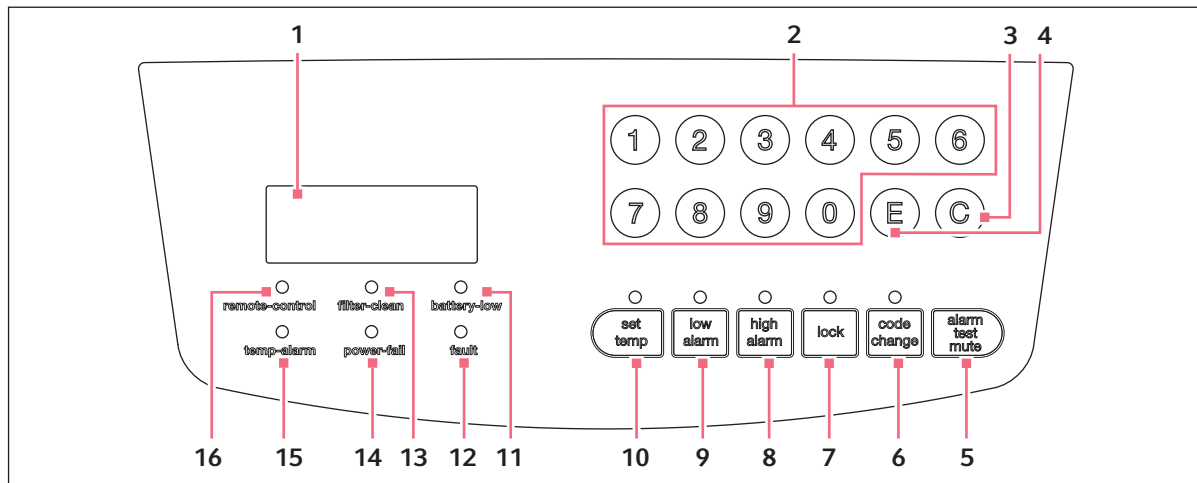


Fig. 3-5: CryoCube chest freezer display panel and keypad

1 Temperature

Displays current freezer temperature in 1 °C increments

2 Numerical keys

1 – 9

3 C key

Used to clear data

4 E key

Used to enter data

5 Alarm test/mute key

Sounds the audible alarm
Mutes the audible alarm if an alarm condition occurs

6 Code change key

Used to change freezer lock codes

7 Lock key

Locks and unlocks the control panel for programming

8 High alarm key

Displays current high alarms
Used to program high alarms

9 Low alarm key

Displays current low alarms
Used to program low alarm

10 Set temperature key

Displays current temperature setting
Used to change temperature settings

11 Battery low indicator

If power is on, illuminates when battery voltage is below 5.6 V and flashes if below 5 V
If power is off, extinguishes if battery voltage is below 5.5 V

12 Fault indicator

Illuminates if there is a system fault within the freezer

13 Filter clean indicator

Illuminates to indicate a blocked or dirty filter
Audible alarm will sound when indicator is flashing

14 Power fail indicator

Flashes to indicate mains/power failure
Audible alarm will sound when indicator is flashing

15 Temperature alarm indicator

Illuminates when setpoint is passed

16 Remote control indicator

Illuminates when freezer is operating under remote computer control via RS-485 and BioCommand® SFI or other laboratory logging software

Product description

CryoCube Freezers
English (EN)

3.2 Delivery package**3.2.1 Inspection of boxes**

Inspect the boxes carefully for any damage that may have occurred during shipping. Report any damage to the carrier and to your local Eppendorf Sales Order Department immediately.

3.2.2 Packing list verification

Unpack your order, saving the packing materials for possible future use. Save the operating manual for instruction and reference. Verify against your packing list that you have received the correct materials, and that nothing is missing. If any part of your order was damaged during shipping, is missing, or fails to operate, fill out the "Customer Feedback" form, available online at <http://www.eppendorf.com/OC-en/about-us/about-eppendorf/contact-us/>.

**NOTICE! Risk of material damage**

- ▶ Vacuum insulation panels are used in the construction of Innova U725G and U410 HEF, U570 HEF, and C660 HEF model freezers. Inspect the cabinet panels for punctures or other damage that compromises the integrity of the product.
- ▶ These panels are mounted in the cavity against the steel outer wall of the freezer. Any drilling or puncture to the outer wall could release the vacuum from the panel, resulting in impaired freezer performance.

3.3 Product versions

This manual provides the user with the necessary information for installation and operation of the Eppendorf energy saving CryoCube F570, F570h, F570hw, FC660, and FC660h freezers.

The following freezer models use HCs as refrigerants and are totally free of CFCs of HFCs:

- F570h (230 V, 50 Hz)
- F570hw (230 V, 50 Hz)
- FC660h (230 V, 50 Hz)



The use of Hydrocarbons as refrigerant is prohibited in the United States.

The following freezer models use HFCs as refrigerants and are available worldwide.

- F570h (115 V, 60 Hz)
- F570 (115 V, 60 Hz; 208 V – 230 V, 60 Hz; 230 V, 50 Hz)
- FC660h (208 V – 230 V, 60 Hz)
- FC660 (208 V – 230 V, 60 Hz; 230 V, 50 Hz)

3.4 Features

Eppendorf ULT are built to stringent regulatory requirements for energy-efficiency, safety and environmental friendliness and disposability, and are CE and UL certified.

3.4.1 Control panel

A digital temperature readout and setpoint keypad are provided on the control panel. Indicator lights provide warning of the following conditions:

- Power loss
- System failure
- Exceeding high or low temperature setpoints
- Low battery voltage
- Filter blockage
- Remote control (via optional RS-485 computer system)

3.4.2 Security

Lockable freezer handles on outer door provide added security against unauthorized users.

3.4.2.1 Electronic lock

To ensure setpoint control, an electronic lock must be disabled before the user can change setpoints for temperature or alarm warnings. Upon delivery, the lock code is *0000* and the freezer remains unlocked. The user may change the lock code through the setpoint keypad.

3.4.3 Compressors

Heavy-duty commercially available compressors provide rapid temperature pull-down and recovery after door opening.

3.4.4 Vent port

CryoCube F570, F570h, and F570hw freezers feature an automatically heated vent port, which enables the outer door to be easily opened at any time.

CryoCube FC660 and FC660h freezers feature a heated port with ice-clearing plunger to prevent a vacuum from forming, enabling the outer door to be easily opened at anytime.

Product description

CryoCube Freezers
English (EN)

3.4.5 Construction

CryoCube freezers are manufactured using high quality steel and electronics for long life, and have many features designed to provide ease of use and maintenance, security and reliability to your ultra-low temperature storage needs.

All freezers are mounted on heavy-duty castors for ease of movement. Upright freezers have feet that provide both a leveling and locking feature to stop the freezer from rolling once it is in place. Chest freezers have locking front castors. These locking front castors do not provide leveling adjustment, so the site chosen for the freezer must have a flat, level floor.

All interior panels and shelves are constructed from durable, high grade, corrosion-resistant stainless steel and are easy to sterilize and keep clean.

3.4.6 Access ports

Two access ports allow sensors or back-up systems to be easily installed. This optional equipment can provide cooling protection for your samples in the case of a power outage or system failure.

3.4.7 External monitoring

An alarm contact is provided for connection to an external monitoring device or system.

The freezers can also be fitted with an optional 7-day circular chart recorder to provide independent temperature recording, or a TCA-3 temperature monitoring system.

3.4.8 Automatic reset

Turning multiple freezers on at once can cause electrical spikes that damage the microprocessor. To prevent this, an automatic reset restarts the unit at 15 second intervals

3.4.9 Accessories

Multiple accessories are offered for CryoCube freezers. For more information, (see *Accessories on p. 51*).

4 Installation

4.1 Preparing installation



WARNING! Risk of personal injury

- ▶ DO NOT attempt to lift any freezer by hand. Preferred lifting for loading and unloading is by mechanical lifting equipment.
-



NOTICE! Risk of material damage

- ▶ Maintenance, adjustment and repair work should be carried out only by QUALIFIED, EXPERIENCED personnel who have been AUTHORIZED to undertake such work by Eppendorf or its authorized agents.
-

4.2 Selecting the location

Position the freezer to allow disconnection to be made in respect to removal of the plug or appliance coupler, also the free air entry through the intake grill in the front and free air exit from the back. Provide a clearance of at least 150 mm (6 in) on all sides.

For efficient temperature control, the freezer should be placed in a shaded area, away from sources of excessive heat. For maximum cooling capability, the product should be located in an air-conditioned room.

4.2.1 Occupancy rating (230 V, 50 Hz models only)

This equipment has a category A1 - B1 occupancy rating, with a refrigerant charge of less than 0.15 kg per sealed system.

Systems charged with less than 0.15 kg may be installed in any size room as long as adequate ventilation is provided, in order to remove rejected heat from the freezer and to vent any sudden loss of refrigerant in case of system failure.

4.2.2 Below ground installations (230 V, 50 Hz models only)

We recommend allowing at least 18 m³ (23.5 yd³) room volume for each freezer, to keep the air/refrigerant concentration from exceeding 20 % of the Lower Flammability Limit (LFL) in the event of a sudden loss of refrigerant into the room.

Basements and cellars must have adequate ventilation for the removal of heat rejected from the freezer(s).

4.2.3 Installation categories (230 V, 50 Hz models only)

Category	Examples	Requirements
A1 (domestic/ public)	Hospitals Prisons Theaters Schools Supermarkets Hotels Dwellings	< 0.15 kg refrigerant per sealed system
B1 (commercial/ private)	Business or professional offices Shops Restaurants Laboratories General manufacturing	< 0.15 kg refrigerant per sealed system

4.3 Mains/power plugs and sockets













WARNING! Risk of personal injury from electric shock and power supply

- ▶ Before connecting the CryoCube freezer to the mains/power supply, make sure that the mains/power supply matches the requirements of the equipment.
- ▶ Check the specification plate (located on the side of the freezer) for the electrical requirements.
- ▶ Ensure the CryoCube freezer is connected to an earth/grounded socket.

Eppendorf freezers are offered with a variety of mains/power cords to accommodate local voltage requirements. To determine the mains/power socket required in your lab, first identify the plug we provide from the list below and check the freezer rating plate for mains/power requirements.

- All 115 V, 60 Hz freezers use plug B
- All 208 V – 230 V, 60 Hz freezers use plug C
- All 230 V, 50 Hz freezers are provided with both plugs D and E

Freezers with this code	Have this plug	Require this socket	NEMA reference	
			Plug	Socket
A			5 – 15 P	5 – 15
B			5 – 20 P	5 – 20
C			6 – 15 P	6 – 15
International				
D			European (Schuko)	
E			UK model	

4.4 Requirements for water-cooled models

If your freezer has a water-cooled condenser, the following are water supply and drainage requirements:

Minimum flow requirements	3.8 L/min
Max inlet pressure	10 bars
Min inlet pressure	1 bar
Maximum supply temperature ¹	25 °C
Minimum supply temperature ²	7.0 °C
Connection size	Inlet: 15 mm x 1/2" BSPT Outlet: 15 mm x 1/2" BSPT
Water quality	Water must be clean and free from particles that could cause blockage in the regulating valve or heat exchanger. A suitable inline strainer must be placed in the inlet pipe if there is any doubt about the cleanliness of the supply. The minimum filter requirement is 60 mesh 0.25 mm aperture.
Drainage requirements ³	A recirculated cooler return line and a main supply line to the waste drain are required.
Typical flow rates	At a setpoint of -85 °C, an ambient temperature of 21 °C – 23 °C, and a water inlet temperature of 20 °C (see <i>Water flow rate on p. 24</i>): 29 L/h for the U725G.

¹Water consumption will increase as water temperature increases.



²The condenser must never be allowed to freeze during operation. If, during normal cycling, water temperature approaches 6.0 °C, this must be checked.

³This installation requires checking the high stage discharge pressure and may require an adjustment of the water regulating valve; both operations MUST be carried out by a qualified engineer.



The minimum pressure differential requirement is 0.5 bar between water inlet and water outlet ports.

4.5 Connecting multiple water-cooled freezers



-  The water inlet pressure must always be higher than the water outlet pressure. The parallel connection method allows users to connect a large number of freezers as long as piping size is determined correctly to cope with required flow rate.
-  It is recommended that a pressure regulator be used at the inlet of each freezer to monitor water pressure.

For water connection requirements, (see *Requirements for water-cooled models on p. 21*).

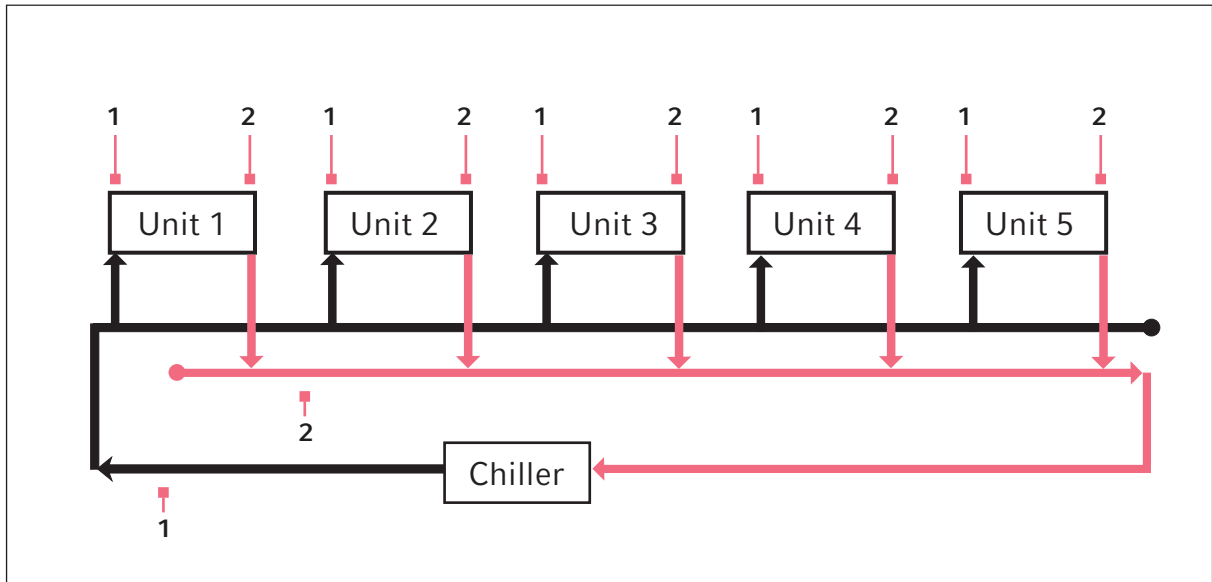
In order for the water-cooled freezer to operate correctly, one of the following installation setups will apply:

- Connecting freezers to a recirculating chiller
- Connecting freezers to the non-recirculating water supply (no chiller)

4.5.1 Connecting freezers to a recirculating chiller

-  The chiller must have appropriate cooling capacity.
-  Never connect multiple freezers to a single water/chiller line in series; the temperature rise at the outlet from the first freezer makes it unsuitable to use for cooling of additional units.

To connect multiple freezers to a recirculating chiller to cool down ejected water to the required temperature of 25 °C or below, follow the setup below:

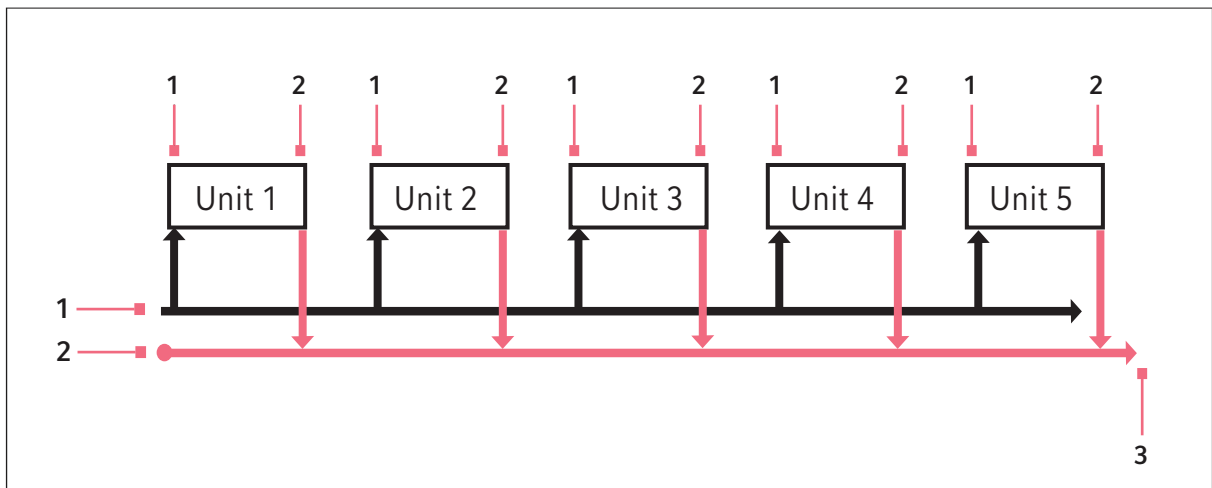


1 Inlet

2 Outlet

4.5.2 Connecting freezers to the non-recirculating water supply (no chiller)

To connect multiple freezers to the non-recirculating water supply without chiller, follow the setup below:



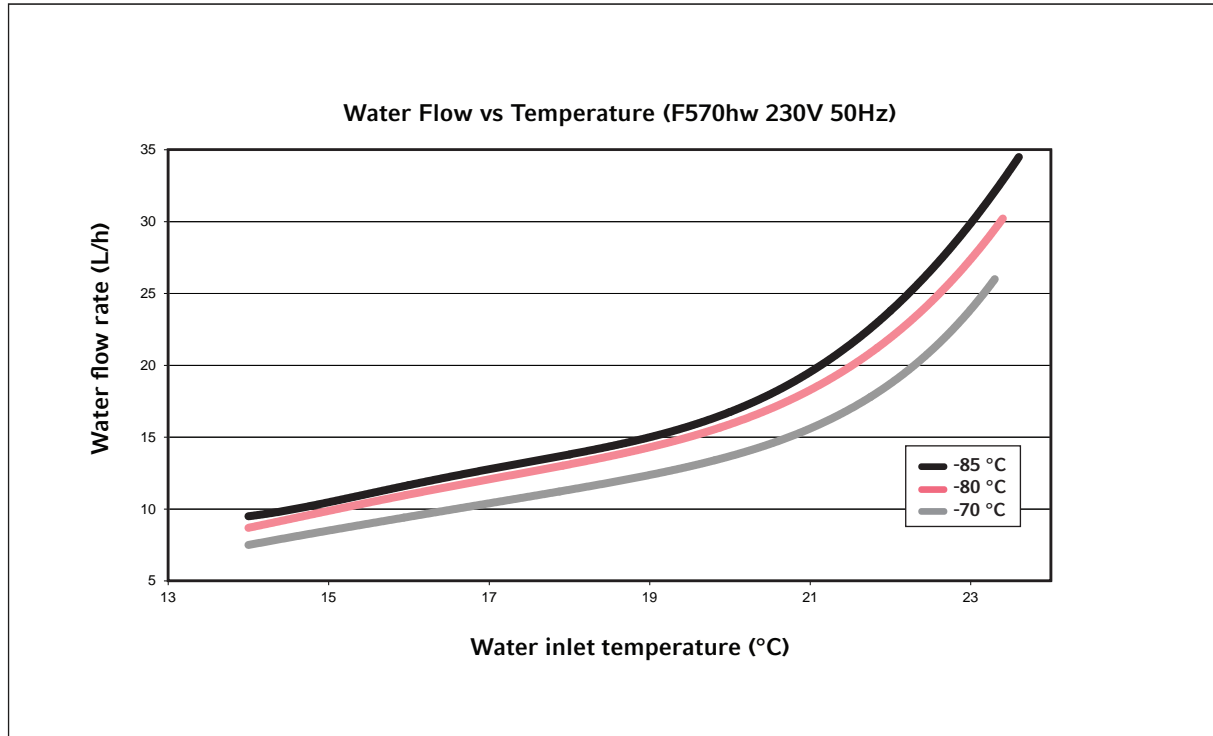
1 Inlet

3 Drain

2 Outlet

4.6 Water flow rate

This graph shows the typical water consumption when the freezer water regulating valve is fixed at the factory setting.* The freezer is operating in normal stable conditions with no door openings.



*Note: At the factory, the freezer is set up to have a 25 °C high stage refrigerant condensing temperature. This is the temperature that the refrigerant leaves the high stage condenser in our cascade system. Achieving this temperature is dependent on the flow of the water passing through the high stage condenser, which is controlled by the water regulating valve. The 25 °C high stage refrigerant condensing temperature was selected to provide the best balance between typical water temperatures used by our customers and energy efficiency.

4.7 CryoCube F570 and F570h/F570hw shelves

The internal shelves are level with the bottom of each inner door, and held in place during transportation by transport clips located above each shelf. These transport clips can be removed once the freezer is in position.

- ▶ Squeeze each transport clip to remove.



The shelves can be repositioned if required.

To reposition the shelf:

1. Gently squeeze the shelf clip to release it from the side of the freezer.
2. Reposition the clips and shelf.



Maximum freezer shelf load is 40 kg (88 lb).

4.8 Lockable freezer handle

The door handle has a cam action to pull the door closed and a reverse cam action to break the seal so the door can be opened. When closing the outer door, ensure that the cam is engaged for correct operation. The initial vacuum inside the cabinet may cause the door to appear closed, but when the vacuum releases, the door will open. Always ensure the handle is properly engaged. It is important that the heated vent port is kept clear. This will avoid putting undue stress on the handle mechanism.

Freezers are supplied with lockable handles.

The FC660 is fitted with a quarter turn key lock.



NOTICE! Risk of material damage due to improper door handling

- ▶ Do not slam the door with the handle in the closed position.
-

The upright freezer is fitted with a barrel lock. The key can be removed in open or locked position.

To lock the freezer:

1. Insert the key and push in slightly (2 mm – 3 mm) to depress lock tumblers.
2. Turn the key a quarter-turn to the right (or left).
3. Push lock in.
4. Turn the key a quarter-turn back to the upright position.
5. Remove key.

To unlock the freezer:

6. Insert the key and push in slightly (2 mm – 3 mm) to depress lock tumblers.
7. Turn the key a quarter-turn to the right (or left).
8. Release the lock.
9. Turn the key a quarter-turn back to the upright position.
10. Remove the key.

5 Operation

5.1 Getting started



WARNING! Risk of personal injury from electric shock and power supply

- ▶ Before connecting the CryoCube freezer to the mains/power supply, make sure that the mains/power supply matches the requirements of the equipment.
 - ▶ Check the specification plate (located on the side of the freezer) for the electrical requirements.
 - ▶ Ensure the CryoCube freezer is connected to an earth/grounded socket.
-

5.1.1 Plug in

Once you have verified that the mains/power supply matches the electrical requirements of the freezer, connect the product to the mains/power supply using the mains/power cord provided.



NOTICE! Risk of material damage due to incorrect power cords

Some freezers are supplied with more than one removable mains/power cord. Use the cord that matches your power receptacle.

- ▶ Check the voltage rating plate on the side of the CryoCube freezer to confirm that the freezer is compatible with your laboratory mains/power supply.
 - ▶ Only use approved mains/power cords with the correct power rating.
 - ▶ Contact your local Eppendorf sales office for replacement cords.
-

5.1.2 Turning the freezer on/off



WARNING! Risk of personal injury from electric shock

- ▶ Ensure the CryoCube freezers is connected to an earth/grounded socket.



WARNING! Risk of personal injury from flammable components

Flammable warning messages alert you to possible risks of personal injury and equipment damage.

- ▶ Protect the system from sparks and flames.



WARNING! Risk of personal injury from flammable components

The on/off circuit breaker and battery switch are fitted with IP65 plastic covers, to prevent a possible source of ignition.

- ▶ Do not remove the covers.
- ▶ Cover replacement must be performed by a qualified and authorized person.

The **on/off** circuit breaker is located within the lockable panel at the bottom right-hand corner of the upright freezer or to the left of the control panel on the chest model.

To remove the lockable panel and turn the circuit breaker and battery switch on/off:

1. Insert and turn the key (provided) one quarter turn to the right.



The key can be removed to prevent access.

2. Remove the panel.
3. Set the **on/off** circuit breaker and battery switch to the **I (ON)** position.

The temperature display illuminates immediately.

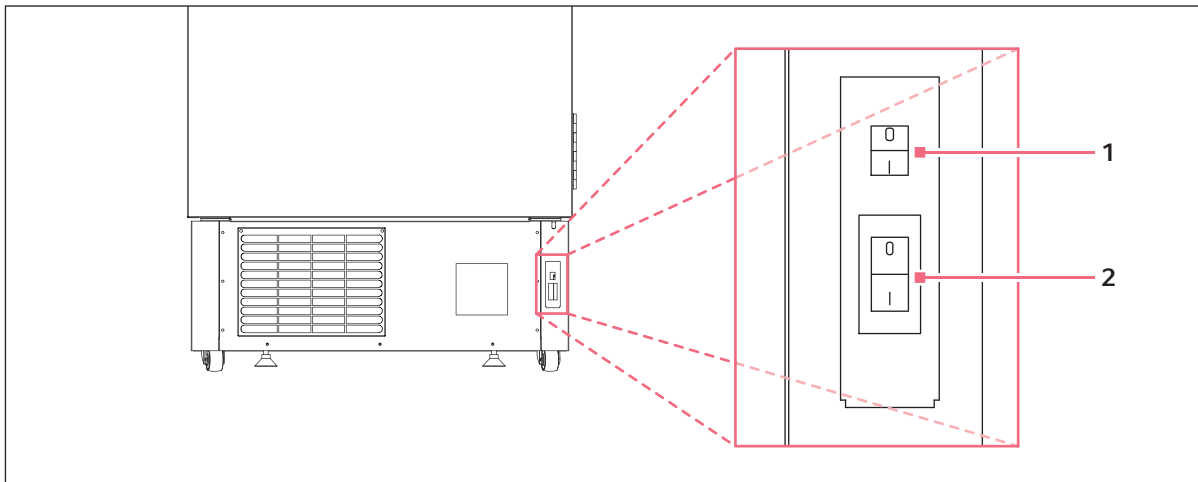


Fig. 5-1: CryoCube upright freezers switch location

1 Battery switch

2 On/off circuit breaker switch

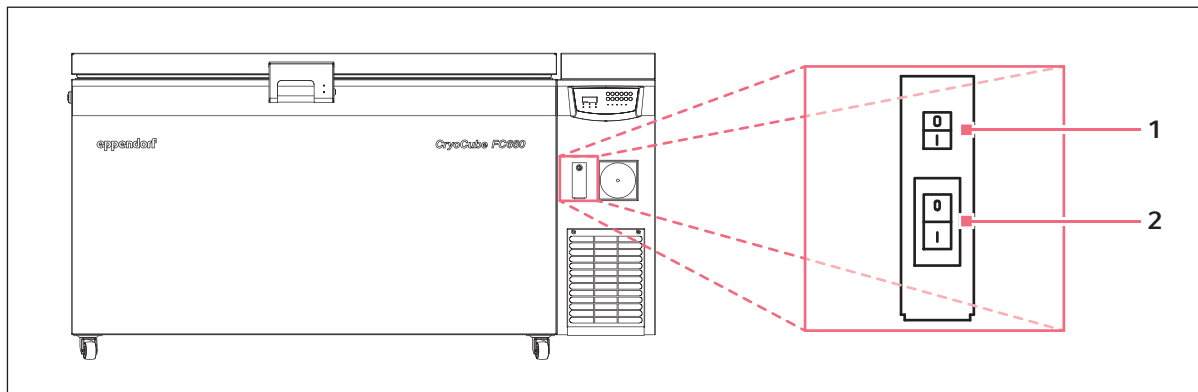


Fig. 5-2: CryoCube chest freezers switch location

1 Battery switch

2 On/off circuit breaker switch

- i** The compressors will not operate for approximately three minutes after connection of the mains/power supply, because there is an automatic delay device in the circuit. Temperature and alarm settings can be adjusted immediately.

5.1.3 Alarm/battery activation

The equipment is delivered with the battery deactivated. The power fail alarm is activated by the battery rocker switch within the lockable panel, which is located at the bottom right-hand corner. The switch is labelled **I (ON)** and **O (OFF)** (see Fig. 5-1 on p. 28) and (Fig. 5-2 on p. 29).

- ▶ To activate the alarm, place the battery switch in the **I** position.
- i** Failure to turn on the battery switch may lead to a discharged battery, low battery alarm indication, and/or a disabled alarm system.
- ▶ After activating the alarm, test its operation by pressing the **ALARM TEST/MUTE** key on the display. The audible alarm should sound.

The **ALARM TEST/MUTE** key also tests the LED indicators. All of the LEDs should light up together when the button is pressed.

- i** Pull down time to -86 °C will be dependent on the freezer size and model (see *on p. 45*). The alarm will sound every 30 min until the temperature setpoint is reached. Use the **ALARM TEST/MUTE** key to mute the alarm during this initial pull-down period.

If the freezer is turned off during the initial pull-down period, the alarm will activate 30 min after switching it back on.

The factory-set temperature is -80 °C .

5.1.4 Testing the alarm monitoring socket

The freezer is fitted with a remote alarm socket for testing power-fail and low battery alarms, and for connection to an external building monitoring system, (see *Remote alarm socket on p. 34*). To test the alarm monitoring socket:

- ▶ Turn off (**O**) the **on/off** circuit breaker.

This will test the **POWER FAIL** and **ALARM** output at the same time.

The battery must be switched on to test the **POWER FAIL**. The remote alarm facility provides voltage-free contacts rated at 1 A, 24 V maximum.

5.1.5 Vacuum effect

After closing the freezer door or lid, a vacuum may be created. Before the door can be opened again, it may be necessary to wait 1 or 2 min for the vacuum to be released by the vent port. Do not try to force the door open. During the release of the vacuum, a slight hissing sound may be heard. The heated vent is designed to keep the port clear of ice (see *Electrically-heated automatic vent port on p. 38*).

5.2 Programming the freezer

Set the freezer to any temperature within the range from -50 °C to -86 °C.



All temperature setpoints are automatically negative °C.

5.2.1 Setting operating temperature

To set the operating temperature for the freezer:

1. Press the **LOCK** key.



The **LOCK** indicator will flash if a lock code (password protection) is required, (see *Changing lock codes on p. 33*).

The **LOCK** indicator will illuminate, indicating the system is unlocked and parameters can be changed.

2. Press the **SET TEMP** key.

Its indicator will flash and the display will indicate 0.

3. Using the numerical keys, enter a new temperature (from -50 °C to -86 °C).

The temperature selected will appear in the **TEMPERATURE** display.

4. When the correct temperature is displayed, press the **E** key to enter the data. To set the high alarm setpoint skip to (see *Setting high alarm setpoint on p. 31*), step 2.

The **SET TEMP** indicator will go off.

5. Press the **LOCK** key to exit programming.

The **LOCK** indicator will go off and the freezer will return to normal mode.



Press the **C** key to clear the display during programming.

5.2.2 Setting high alarm setpoint

The high alarm setpoint may not be warmer than -10 °C and may not be less than within +5 °C of the operating temperature. The default setting is +5 °C from the temperature setpoint.

1. Press the **LOCK** key.



The **LOCK** indicator will flash if a lock code (password protection) is required, (see *Changing lock codes on p. 33*).

The **LOCK** indicator will illuminate, indicating the system is unlocked and parameters can be changed.

2. Press the **HIGH ALARM** key.

Its indicator will flash and the display will indicate 0.

3. Using the numerical keys, enter a new alarm setpoint temperature.

The selected temperature will appear in the **TEMPERATURE** display.

4. When the correct temperature is displayed, press the **E** (Enter) key to enter the data. To set the low alarm setpoint skip to (see *Setting low alarm setpoint on p. 31*), step 2.

The **HIGH ALARM** indicator will turn off.

5. Press the **LOCK** key to exit programming.

The **LOCK** indicator will go off and the freezer will return to normal mode.



Press the **C** key to clear the display during programming.

5.2.3 Setting low alarm setpoint

The low alarm setpoint may not be colder than -91 °C and may not be more than within -5 °C of the operating temperature. The default setting is -5 °C from the temperature setpoint.

1. Press the **LOCK** key.



The **LOCK** indicator will flash if a lock code (password protection) is required, (see *Changing lock codes on p. 33*).

The **LOCK** indicator will illuminate, indicating the system is unlocked and parameters can be changed.

2. Press the **LOW ALARM** key.

Its indicator will flash and the display will indicate 0.

3. Using the numerical keys, enter a new alarm setpoint temperature.

The selected temperature will appear in the **TEMPERATURE** display.

4. When the correct temperature is displayed, press the **E** (Enter) key to enter the data.

The **LOW ALARM** indicator will turn off.

5. Press the **LOCK** key to exit programming.

The **LOCK** indicator will go off and the freezer will return to normal mode.



Press the **C** key to clear the display during programming.

5.2.4 Checking temperature and alarm setpoint settings

To view the currently set operating temperature, high alarm setpoint, or low alarm setpoint for the freezer.

- ▶ Press the **SET TEMP** key, **HIGH ALARM** key, or the **LOW ALARM** key and read the display.



If you press the **SET TEMP**, **HIGH ALARM** or **LOW ALARM** key while the **LOCK** key indicator is flashing, the display will read --- , which indicates that the freezer is locked.

5.2.5 Setting the alarm delay

The **HIGH ALARM** audible alarm and the **REMOTE ALARM** monitoring socket can be programmed to a time delay set between 0 – 40 min.

The default time delay is 30 min. If the time delay is set to 0 min, the system will program it as 15 s.



Press **KEY 8** to display the High Temperature audible alarm delay, and press **KEY 9** to display the Remote Alarm Socket switching delay.

To set the audible **HIGH ALARM** delay (**KEY 8**):

1. Press the **LOCK** key.
The **LOCK** indicator illuminates, indicating the system is unlocked and parameters can be changed.
2. Press keypad button **8**.
pp flashes on the display.
3. Enter the desired value (e.g., press keypad buttons **1** and **0** to designate 10 min).
4. Press the **E** (Enter) key.
The **LOCK** indicator goes out.

To set the **REMOTE ALARM** socket time delay (**KEY 9**):

1. Press the **LOCK** key.
The **LOCK** indicator illuminates, indicating the system is unlocked and parameters can be changed.
2. Press keypad button **9**.
pp flashes on the display.
3. Enter the desired value (e.g., press keypad button **5** to designate 5 min).
4. Press the **E** (Enter) key.
The **LOCK** indicator goes out.

If the number entered is valid, --- flashes on the display, the value has been stored, and the **LOCK** indicator goes out. (This is a one-shot operation.)

If the number entered is out of range, **-EE-** shows on the display and the operation will need to be repeated using a valid number.

5.2.6 Changing lock codes



If you enter a lock code when there is none, or if you replace an existing lock code with a new one, take note of the new code before you enter it.

If the code is forgotten, you will need to contact Customer Service to regain access to the programming mode of the freezer.

The freezer is delivered unlocked. To change the code, the freezer must be unlocked. If a lock code has already been set (indicated by the **LOCK** indicator flashing when the **LOCK** key is pressed), that same code must be entered to unlock the freezer. When the freezer is unlocked, the **LOCK** indicator is on (not flashing).

Once the freezer is unlocked, follow these steps to set a new lock code:

1. Press the **CODE CHANGE** key.
The indicator will flash and the display will go blank.
2. Using the numerical keys, enter the new four-digit number. Check it on the display.
3. Press the **C** key to cancel the entry if the display shows it to be incorrect, then enter the correct number.
4. When the number is correct, record the new number somewhere secure. Then press the **E** (Enter) key.
The **CODE CHANGE** indicator will turn off.
5. Press the **LOCK** key.
Its indicator will turn off.

The freezer now has a new lock code. If at any time you wish to change this code, you will have to enter this code to unlock the system before you can enter a new code.

Setting the lock code to **0000** disables the lock completely. With the **0000** code, press the **LOCK** key to reprogram the freezer.

5.2.7 Setting the temperature offset

The temperature offset function enables to add a temperature offset to the factory defined temperature settings.

1. Press the **LOCK** Key.
2. Press the **C** key to access the offset function.
3. Press **0**, **1**, **2**, **3**, or **4** key to set the offset in degrees.
4. Press the **ENTER** key to confirm selection.



Set temperature offset to "0" for no offset.

5.3 Battery backup switch

This is a rocker switch labeled **I/O** behind the locked front panel. In the **O** position, the battery is disconnected. This position should only be used while in transit, in storage, or to change the battery.

At all other times the switch should be kept in the **I** position for the battery to be charged, and for the alarm function to be available in the event of mains/power failure. **(Failure to set the switch may result in impaired battery life, and the alarm will not trigger if the mains/power fails.)**

With the battery switch on, during a mains/power failure, the internal freezer temperature will be displayed at ten-second intervals, and the audio alarm will also sound. The audible alarm may be muted by pressing the **ALARM TEST/MUTE** key on the control panel, but will sound again after 30 min if the fault has not been corrected. Pressing the same button again will mute the alarm for an additional 30 min; the pattern will continue to repeat until the initial problem is corrected.

5.4 RS-485 connection

RS-485 interface shall secure double/reinforced insulation from mains voltage (According to 61010-1).

An optional serial I/O connection rated 5 V max for RS-485 connection can be fitted. Contact your local Eppendorf distributor for details.

5.5 Remote alarm socket



CAUTION!

- ▶ Hazardous voltages must not be connected to the remote alarm socket.
 - ▶ Maximum rating is 24 V, 1 A.
-

The freezers are provided with an alarm monitoring socket at the rear of the freezer and a matching plug for external monitoring purposes. This plug can also be connected to either a central monitoring system or to a remote alarm via an audio-dialer.

Within the freezer, the socket is connected to voltage-free contacts rated as 24 V, 1 A.

In normal operation, with the power on:

- Relay R1 on the control PCb is energized, connecting pin 1 to pin 2 on the alarm monitor socket (N/C).

While in the alarm condition, with the power off:

- Relay RL1 is de-energized, connecting pin 1 to pin 3 on the socket (N/O).

The high temperature alarm output to the remote alarm monitoring socket can be programmed to a set time delay (see *Setting the alarm delay on p. 32*).

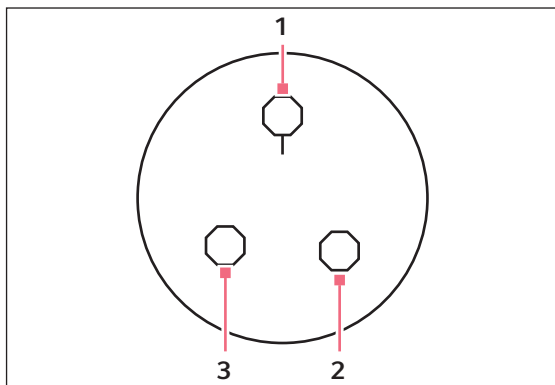


Fig. 5-3: Remote alarm socket - chest freezer

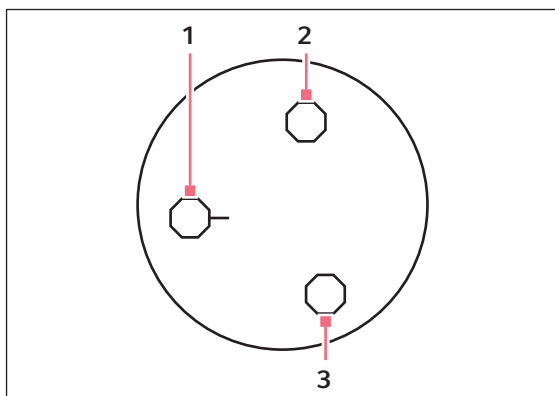


Fig. 5-4: Remote alarm socket - upright freezer

6 Maintenance

6.1 Cleaning



NOTICE! Risk of material damage from unauthorized maintenance.

Failure to use unauthorized service agents can result in damage to the device.

- ▶ Maintenance, adjustment, and repair work should only be carried out by qualified and experienced personnel who have been authorized by Eppendorf or its authorized agents to undertake such work.
-

6.1.1 Painted surfaces

All exterior paint work and inner doors should be cleaned using a solution of mild detergent in water. Do not use abrasive cleaners or solvents.

6.1.2 Panels and shelves

The interior panels and shelves are made of stainless steel. They may be cleaned and sterilized.

- ▶ Apply the recommended cleaning solvent (70 % Isopropyl alcohol, 30 % distilled water) with a soft, lint-free cloth.

6.1.3 Air intake grill and filter



NOTICE! Risk of material damage due to blocked airflow

Serious damage to the CryoCube freezer may result if the air intake is blocked.

- ▶ Check that there is no obstruction of the airflow to the freezer.
 - ▶ Remove the filter from behind the grill by turning the thumbscrews $\frac{1}{4}$ turn and opening grille downward. The filter should be washed in warm soapy water and left to air dry before replacing.
-

The air intake grill must be cleaned regularly to keep it free from dust and debris. Under normal conditions, clean the grill once every 3 months. If the area around the freezer is very dusty or dirty, clean the grill more often.

- ▶ Brush the grill with a soft brush and, if a vacuum cleaner is available, vacuum the dust from the grill.

6.1.4 Electrically-heated automatic vent port



There is an electrically-heated automatic vent port in the freezer which must not be allowed to become blocked or sealed off.

On upright freezers, the vent port is located in the outer door. This vent will automatically activate each time the door is opened and closed. To manually override, press the **VENT** button on the front face.

On Chest freezers, the vent port is located on the left hand side. To clear the port, press the spring loaded plunger on the outside of the air vent.

6.1.5 Door or lid seal

Be sure to treat the door or lid seal with care. Avoid damaging this seal in any way. The freezer cannot operate properly with a defective seal.

- ▶ It is advisable to wipe both the seal and the surface against which it seals with a soft dry cloth once a month.

6.2 Routine maintenance

6.2.1 Lubrication

Every 12 months the outer door hinges and the handle mechanism should be *lightly* lubricated using general-purpose oil or spray grease.

6.2.2 Defrosting

After an extended period of operation, defrosting may become necessary:



NOTICE! Risk of material damage from defrosting equipment

- ▶ Do not attempt to chip or scrape the ice with a sharp instrument.
 - ▶ Allow the ice to melt naturally.
-

1. De-activate the alarm by switching the battery (alarm) switch (located behind the lockable panel on the front of the freezer) to off (**O**).
2. Unplug the freezer from the mains/power supply.
3. Leave the inner and outer doors or lids open.
4. Allow the accumulated ice to melt.
5. Mop up the resulting water.
6. Dry and decontaminate the interior of the freezer.
7. When defrosting is complete, reconnect the freezer to the mains/power supply.
8. Turn the mains/power switch on (**I**) and re-activate the battery (alarm) switch.

6.2.3 Removing the inner doors (upright models)

To remove the inner doors of the CryoCube F570, F570h, and F570hw freezers:

1. Fully open the outer door of the freezer.
2. Fully open the inner door.
3. Lift off inner door from hinges and set aside.

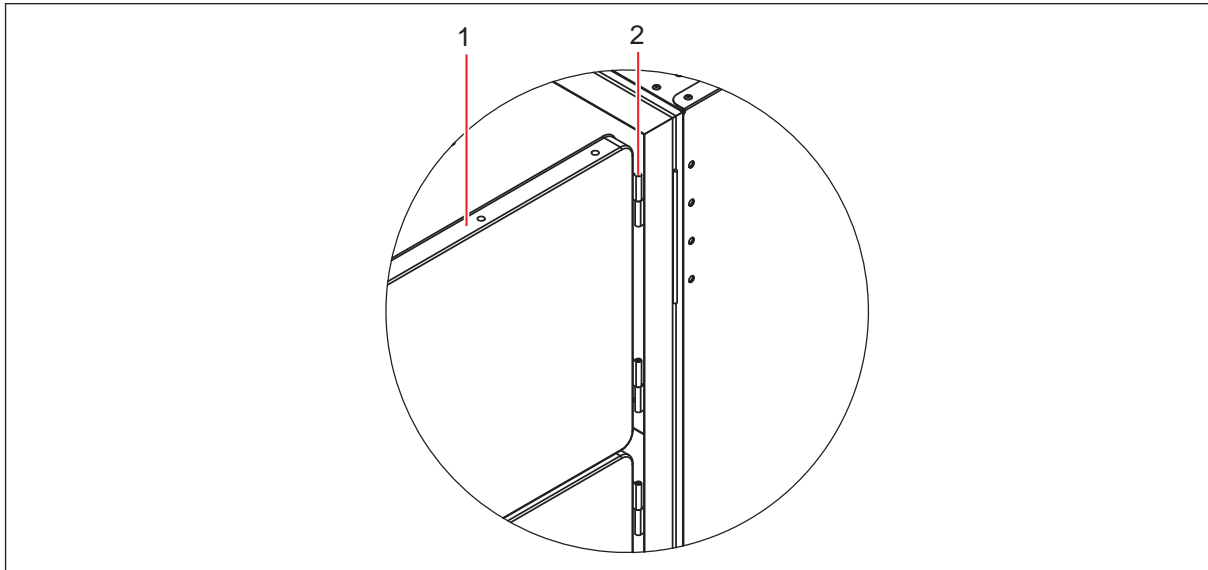


Fig. 6-1: Lift-off inner door

1 Inner door

2 Lift-off hinge

Repeat procedure for each door.

6.2.4 Replacing the inner door (upright models)

To replace the inner door of the CryoCube F570, F570h, and F570hw freezers:

1. Fully open the outer door of the freezer.
2. Fit door to hinge pins and close.
3. Close outer door.

6.2.5 Electrical components



WARNING! Risk of personal injury due to damaged gaskets and sealing grommets

On all Hydrocarbon freezer models, all electrical components that could cause possible ignition of refrigerant vapor during normal operation have been enclosed in an IP65 enclosure. During routine maintenance, care must be taken to avoid any damage to the gaskets and sealing grommets of these enclosures. Failure to observe this safety warning could result in a dangerous situation.

- ▶ Check the gaskets and sealing grommets routinely to ensure their integrity.
 - ▶ Replace the gasket and/or sealing grommet immediately if any damage or deformity is detected.
-

6.2.5.1 Indicators

Regularly check the indicators:

- ▶ Press the **ALARM TEST/MUTE** key.
All of the indicators should illuminate, and the display should read **8888**.

6.2.5.2 Alarm

Regularly check the alarm:

- ▶ Press the **ALARM TEST/MUTE** key.
The **TEMP** indicator should illuminate and the audible alarm should sound.

6.2.5.3 Battery replacement



NOTICE! Risk of material damage from removal of parts

There are no user controls behind any panels. The removal of any part or panels from the CryoCube freezer may damage the product.

- ▶ Only a qualified, authorized Service Engineer should remove parts or perform maintenance.



NOTICE! Risk of material damage from incorrect replacement battery

- ▶ Use only a replacement battery of the correct type and part number.
 - ▶ The battery must be fitted so the terminals correspond to the polarity labels on the electrical panel.
-

The 6 V 2.8 Ah battery is mounted on the electrical panel. This is located behind the right-hand base cover.

To replace the battery:

1. Switch off the mains/power switch and disconnect the mains/power supply.
2. Remove the side cover and the battery clamp securing the battery to the electrical panel.
3. Disconnect the battery terminals.
4. Install the new battery, fixing screws, and the side cover.



Be certain, when reconnecting the battery, to respect the correct polarity (red is + positive and black is – negative).

5. Reconnect the freezer to the mains/power supply and turn the mains/power switch on (I).

6.2.5.4 Fuses

Fuses must be replaced by an Eppendorf service engineer. Contact Eppendorf Service.

6.3 Service safety checklist

Fill out this form before servicing. A copy of this form must be provided to the service engineer for their safety records.



1. Freezer contents Yes No
Risk of infection Yes No
Risk of toxicity Yes No
Risk from radioactive sources Yes No

(List all potentially hazardous materials that have been stored in this unit.)
Notes:

2. Contamination of the unit:
Unit interior Yes No
No contamination Yes No
Decontaminated Yes No
Contaminated Yes No
Others

3. Instructions for safe repair/maintenance of the unit:
a) The unit is safe to work on Yes No
b) There is some danger (see below) Yes No
Procedure to be adhered to in order to reduce safety risk indicated in b) below.

Date :
Signature :
Address, Division :
Telephone :

Product name :
Model :
Serial number :
Date of installation :

Please decontaminate the unit yourself before calling the service engineer.

7 Troubleshooting

7.1 General errors

If you are experiencing a problem with your freezer, check the following troubleshooting guides before contacting your Eppendorf authorized Service technician.

Problem	Cause	Solution
Door will not open.	• Door handle is locked.	▶ Unlock the door handle.
	• Heated vent port is blocked.	▶ Break up the ice in the vent port using the plunger.
FILTER-CLEAN indicator lights.	• Filter is contaminated	▶ Clean the filter. ▶ Call Eppendorf service if the indicator remains lit after cleaning.

7.2 Error messages

Your electronically-controlled Eppendorf freezer incorporates the unique Systems Monitoring And Reporting Technology (S.M.A.R.T. Plus™) self-diagnostic software to diagnose faults in its electronic systems, its probes and/or its refrigeration system.

This table interprets error codes that may appear in the control panel display:

Problem	Cause	Solution
E-01	• PT100 Probe 1 failure. • This probe, located inside the freezer cabinet, indicates cabinet temperature.	▶ Call the Eppendorf service department.
E-02	• Probe 2 failure. • This probe monitors the cascade condenser.	
E-03	• This probe monitors the air-cooled condenser.	
E-04: Air-cooled temperature too high.	• Filter may be blocked.	▶ Clean the filter according to the instructions.
	• Ambient temperature may be too high.	▶ Cool the room.
E-04: The alarm continues to sound.	• Fan may have failed.	▶ Call the Eppendorf service department.

7.3 After a mains/power failure

If mains/power is interrupted, the **POWER-FAIL** indicator will illuminate. In addition, the audible alarm will sound and the display will flash at approximately 10-second intervals.

When mains/power is restored, both alarm and light will automatically be cancelled.

If mains/power has been interrupted for only a short time, the internal temperature of the freezer will not have risen above the temperature setpoint (the user-set alarm threshold), so normal operation will be resumed immediately.

If the interruption was long enough for the internal temperature to rise above the temperature setpoint, the **TEMP-ALARM** indicator will illuminate. If the internal temperature does not fall below the temperature setpoint within the programmed time after mains/power was restored, the audible alarm will sound again. The **TEMP-ALARM** indicator will extinguish when the internal temperature reaches the High Alarm temperature set point.

7.4 Interior warming

If the lid or door is left open long enough for the internal temperature to rise above the temperature setpoint, the same effects will be observed as described above regarding power failure.

To minimize the risk of this happening, the lid or door should only be opened when necessary, for a short period of time.

The upright freezers are fitted with internal doors which latch shut, minimizing temperature rise when the outer door is opened. Chest freezers are fitted with inner insulating lids to ensure efficient running of the freezer. The lids should remain fitted at all times when the freezer is running.

8 Technical data



Technical specifications are subject to change.

8.0.1 CryoCube F570

Part No.	F570300001 (230 V, 50 Hz)	F570200005 (115 V, 60 Hz) F570400005 (208 V – 230 V, 60 Hz)
Lock	Standard	
No. Compartments	5	
Interior	Stainless steel grade 304 2B	
Alarms	High/Low temperature, power fail, battery low, filter clean, fault	
Insulation material	Vacuum insulation panels and polyurethane foam	
Noise level	59.5 dB	59.7 dB (115 V) 58.8 dB (208 V)
Remote alarm port	Standard	
RS-485 interface	Optional	
Refrigerants	High Stage: R404A Low Stage: R508B	
‡Power consumption	10.5 kWh/day	12.0 kWh/day (115 V) 11.5 kWh/day (208 V)
Mains/power supply	7.0 A	16.5 A (115 V) 6.5 A (208 V)
‡Heat output	438 W, 1495 BTU/h	500 W, 1706 BTU/h (115 V) 479 W, 1634 BTU/h (208 V)
Pull down time: from 22 °C to -85 °C (freezer empty)	5.1 h	4.7 h (115 V) 4.7 h (208 V)
Performance	-50 °C – -86 °C at 32 °C maximum ambient operating temperature	

‡Freezer set to -80 °C, ambient 21 °C – 23 °C at rated mains/power supply. Values are average readings conducted under controlled conditions.



Measurements for noise test conditions taken at a distance of 2 m and 1 m from the floor. Background noise level = 30 dB.

8.0.2 CryoCube F570h (air-cooled) and CryoCube F570hw (water-cooled)

	F570h	F570hw
Part No.	F570320001 (230 V, 50 Hz) F570220005 (115 V, 60 Hz)	F570320101 (230 V, 50 Hz)
Lock	Standard	
No. Compartments	5	
Interior	Stainless steel grade 304 2B	
Alarms	High/Low temperature, power fail, battery low, filter clean, fault	
Insulation material	Vacuum insulation panels and polyurethane foam	
Noise level	59.1 dB (230 V) 58.8 dB (115 V)	56 dB (230 V)
Remote alarm port	Standard	
RS-485 interface	Optional	
Refrigerants	High Stage: R290/Low Stage: R170 (230 V) High Stage: R404A/Low Stage: R508B (115 V)	High Stage: R290/Low Stage: R170 (230 V)
‡Power consumption	7.6 kWh/day (230 V) 9.4 kWh/day (115 V)	7.8 kWh/day (230 V)
Mains/power supply	7.0 A (230 V) 16.5 A (115 V)	7.0 A (230 V)
‡Heat output	316 W, 1078 BTU/h (230 V) 392 W, 1338 BTU/h (115 V)	Air: 178 W, 609 BTU/h (230 V) Water: 147 W, 500 BTU/h (230 V)
Pull down time: from 22.0 °C to -85 °C (freezer empty)	4.3 h (230 V) 4.9 h (115 V)	4.1 h (230 V)
Performance	-50 °C – -86 °C at 32 °C maximum ambient operating temperature	

‡Freezer set to -80 °C, ambient 21 °C – 23 °C at rated mains/power supply. Values are average readings conducted under controlled conditions.



Measurements for noise test conditions taken at a distance of 2 m and 1 m from the floor. Background noise level = 30 dB.

8.0.3 CryoCube FC660 and FC660h

	FC660	FC660h
Part No.	F660300001 (230 V, 50 Hz) F660400005 (208 V – 230 V, 60 Hz)	F660320001 (230 V, 50 Hz) F660420005 (208 V – 230 V, 60 Hz)
Lock	Standard	
No. Compartments	1	
Interior	Stainless steel grade 304 2B	
Alarms	High/Low temperature, power fail, battery low, filter clean, fault	
Insulation material	Vacuum insulation panels and polyurethane foam	
Noise level	58.9 dB (230 V) 58.5 dB (208 V)	58.3 dB (230 V) 60.1 dB (208 V)
Remote alarm port	Standard	
RS-485 interface	Optional	
Refrigerants	High Stage: R404A/Low Stage: R508B	High Stage: R290/Low Stage: R170 (230 V) High Stage: R404A/Low Stage: R508B (208 V)
‡Power consumption	10.6 kWh/day (230 V) 10.9 kWh/day (208 V)	8.1 kWh/day (230 V) 9.5 kWh/day (208 V)
Mains/power supply	6.0 A (230 V) 8.0 A (208 V)	6.0 A (230 V) 8.0 A (208 V)
‡Heat output	440 W, 1501 BTU/h (230 V) 454 W, 1549 BTU/h (208 V)	338 W, 1153 BTU/h (230 V) 396 W, 1351 BTU/h (208 V)
Pull down time: from 22 °C to -85 °C (freezer empty)	4.4 h (230 V) 4.8 h (208 V)	3.7 h (230 V) 4.7 h (208 V)
Performance	-50 °C – -86 °C at 32 °C maximum ambient operating temperature	

‡Freezer set to -80 °C, ambient 21 °C – 23 °C at rated mains/power supply. Values are average readings conducted under controlled conditions.



Measurements for noise test conditions taken at a distance of 2 m and 1 m from the floor. Background noise level = 30 dB.

8.1 Power supply

Model	Power configurations
F570	<ul style="list-style-type: none"> • 230 V, 50 Hz • 115 V, 60 Hz • 208 V – 230 V, 60 Hz
F570h	<ul style="list-style-type: none"> • 230 V, 50 Hz • 115 V, 60 Hz
F570hw	<ul style="list-style-type: none"> • 230 V, 50 Hz
FC660	<ul style="list-style-type: none"> • 230 V, 50 Hz • 208 V – 230 V, 60 Hz
FC660h	<ul style="list-style-type: none"> • 230 V, 50 Hz • 208 V – 230 V, 60 Hz

8.2 Environmental conditions

CryoCube freezers use components tested to CE specifications listed below:

- Indoor use
- Ambient temperature 10 °C – 32 °C
- Maximum relative humidity 80 % for temperatures up to 31 °C, decreasing linearly to 50 % relative humidity at 40 °C
- Altitude up to 2000 m
- Power supply voltage fluctuations not to exceed ± 10 % of the nominal voltage
- Installation category II
- Pollution degree 2

8.3 Weight/dimensions

F570 and F570h/F570hw

External dimensions ¹	Width	Depth	Height
	1025 mm (40.4 in)	852 mm (33.5 in)	1940 mm (76.4 in)
Internal dimensions	Width	Depth	Height
	765 mm (30.1 in)	575 mm (22.6 in)	1265 mm (49.8 in)
Capacity	570 L (20.1 cubic feet)		
Net weight	270 kg/595.2 lb (F570) 296 kg/652.6 lb (570h)		

FC660 and FC660h

External dimensions ¹	Width	Depth	Height
	2070 mm (81.5 in)	845 mm (33.3 in)	1090 mm (42.9 in)
Internal dimensions	Width	Depth	Height
	1470 mm (57.9 in)	590 mm (23.2 in)	760 mm (29.9 in)
Capacity	660 L (23.3 cubic feet)		
Net weight	280 kg/617.3 lb (FC660) 304 kg/670.2 lb (FC660h)		

¹To allow for handles, hinges, and bezel, add 80 mm to width and 45 mm to depth of upright freezers and 110 mm to depth of chest freezers.

8.4 Capacity

Model	Capacity
F570	570 L (20.1 cubic feet)
F570h	570 L (20.1 cubic feet)
F570hw	570 L (20.1 cubic feet)
FC660	660 L (23.3 cubic feet)
FC660h	660 L (23.3 cubic feet)

8.5 Compliances

The following information applies to 115 V, 60 Hz units and 208 – 230 V, 60 Hz units only.

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 1 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 B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

9 Ordering information

9.1 Accessories

A number of accessories are available for Eppendorf ultra-low temperature freezers. Contact your local Eppendorf representative or distributor for details.

9.1.1 TCA-3 temperature monitoring system

The TCA-3 system is an independent temperature monitor with alarm, electronic chart recorder, and auto-dialer that communicates via the internet for remote monitoring from anywhere in the world. Ask your Eppendorf sales representative for availability.

9.1.2 Temperature probes

Additional Temperature Probes (such as the Eppendorf A2 monitoring system) can be installed upon request for an external alarm system or for validation.

9.1.3 Validation packages

Installation and operational qualifications are available.

9.1.4 CO₂ and LN₂ back-up systems

These systems are available to temporarily protect the contents of the freezer against the consequences of freezer failure or power failure. In an emergency, the system can inject either liquid carbon dioxide or liquid nitrogen from a storage bottle. Carbon dioxide back-up systems will maintain temperatures between -50 °C and -70 °C (subject to environmental conditions) for a period of up to 48 h, during which time the freezer can be repaired. Liquid nitrogen back-up systems will maintain the freezer temperature at -85 °C.

CO₂ and LN₂ back up systems can be retrofitted by the user. Contact your local Eppendorf distributor for options available. Instructions are included in the kit.

Order number (international)	Description
U9043-0006	Premium/HEF® CO ₂ backup, 115 V – 230 V, 60 Hz
U9043-0008	Premium/HEF® CO ₂ backup, 230 V, 50 Hz
U9044-0006	Premium/HEF® LN ₂ backup, 115 V – 230 V, 60 Hz
U9044-0008	Premium/HEF® LN ₂ backup, 230 V, 50 Hz

Ordering information

CryoCube Freezers
English (EN)

9.1.5 Inventory racking systems

A very comprehensive set of anodized aluminium racks is available. These are designed to accommodate various sizes of boxes neatly, while giving maximum packing density in the freezer. Stainless steel shelves and waterproof boxes as well as custom racking are also available.

9.1.6 Chart recorder

A chart recorder is available to provide a continuous record of the temperature inside the freezer over a period of seven days. The record is presented on a circular chart.

The following items are available for all freezer models:

Order No. (International)	Description	Quantity
P0625-2100	Chart Recorder Kit	1
P0625-2110	Chart Recorder Paper, Range -50 °C – -100 °C	60
K0660-0051	Chart Recorder Pens	3

9.1.7 Eppendorf BioCommand SFI datalogging software (RS-485 interface)

Eppendorf BioCommand SFI Track and Trend software is available to trend and archive data from as many as 32 shakers, CO₂ incubators, and/or freezers, simultaneously. This PC-based software works with any OPC-compliant equipment with an RS-232 or RS-485 port.

10 Transport, storage and disposal

10.1 Shut down

1. Switch the battery switch off before transporting or storing the equipment, (see *Battery backup switch on p. 34*).

10.2 Transport



WARNING! Risk of personal injury

Lifting and transporting the freezer without suitable equipments can result in crushing and other injuries.

- ▶ Use a mechanical lifting equipment to load and unload the freezer.



CAUTION! Risk of material damage

Vibrations and impacts can cause the hermetically sealed compressors to slip out of their suspension system.

- ▶ Do not tilt the equipment.
 - ▶ Avoid vibrations and impacts.
-

Perform the following steps if relocation is necessary:

1. Remove all shelves, racks, and boxes.
2. Carefully move the freezer.

10.3 Disposal

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

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

Within the European Community, the disposal of electrical devices is regulated by national regulations based on EU Directive 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 identification:



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

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

Index

A

Accessories.....51
 Air intake.....37
 Alarm.....34
 Alarm activation29
 Alarm test/mute key34
 Audible alarm34
 Automatic reset18

B

Battery activation29
 Battery backup switch.....34
 Battery replacement.....41

C

Caution, explanation of7
 CFC.....8
 Chart recorder52
 Cleaning37, 38
 Clearance.....19
 CO2 back-up system.....51
 Copyright.....2
 Custom-made racks.....52

D

Danger, explanation of7
 Defrosting.....38
 Disposal54
 Door seal38
 Door/lid stuck30

E

Electrical connection27
 Electrical requirements.....27
 Error codes43

F

Factory-set temperature29

H

Hazard symbols7
 HCFC.....8

I

Ice in vent30
 Inspection of boxes.....16
 Intended use9

L

Lid/door stuck.....30
 LN2 back-up system51
 Lock key.....30
 Lockable panel.....29

M

Mains/power failure.....44
 Mains/power supply27
 Manual conventions.....7
 min.....8
 Monitoring52
 Moving freezer.....53

N

Notice, explanation of.....7

IndexCryoCube Freezers
English (EN)**P**

Packing list verification	16
Panel, removing.....	28
Part numbers.....	52
Plunger	30
Power cord	27
Power fail.....	30
Power failure	34
Programming.....	30

R

Racks	52
Recorder pens	52
Recorder, chart.....	52
Remote monitoring	52
Removing lockable panel	28
Rise in temperature	44
rpm	8
RS-485 computer interface	52

S

S.M.A.R.T. Plus.....	43
Safety.....	9
Set temp key.....	30
Setpoint, temperature.....	44
Setting the operating temperature	30
Symbols used	7

T

Temp alarm.....	44
Temperature probes	51
Temperature setpoint	30, 44
Testing alarm.....	40
Testing alarm monitoring socket.....	30

Testing indicators	40
Trademarks	2
Troubleshooting.....	43
Turning on the equipment.....	27

U

Unpacking boxes	16
Using this manual.....	7

V

Vacuum effect.....	30
Validation packages.....	51
Vent.....	30, 38

W

Warming	44
Warning, explanation of	7

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.

Product name:

CryoCube F570h, CryoCube F570, CryoCube F570hw, CryoCube FC660h, CryoCube FC660
including accessories

Product type:

'F' Prefix designates Upright Freezer
'FC' Prefix designates Chest Freezer
'h' suffix designates High Efficiency
'w' suffix designates water cooled

Relevant directives / standards:

2006/95/EC: EN 61010- 1,
UL 61010- 1, CSA C22.2 No. 61010- 1 (US Voltage 60 Hz Models)
2004/108/EC: EN 61326- 1
FCC Part 15 Class B (US Voltage 60Hz Models)

Date: April 13, 2015



Management Board



Portfolio Management

Your local distributor: www.eppendorf.com/contact
Eppendorf AG · 22331 Hamburg · Germany
eppendorf@eppendorf.com

Eppendorf® and the Eppendorf logo are registered trademarks of Eppendorf AG, Germany.
U.S. Design Patents are listed on www.eppendorf.com/ip.
All rights reserved, incl. graphics and pictures. Copyright 2015 © by Eppendorf AG.

www.eppendorf.com

ISO 9001
Certified

ISO 13485
Certified

ISO 14001
Certified

Evaluate Your Manual

Give us your feedback.
www.eppendorf.com/manualfeedback