Instruction Manual

VWR® ULT Freezer
352/528 Eco Premium

EU cat. No. 471-1252 / 471-1253

NA cat. No. 76514-174 / 76514-176
76533-504 / 76533-506

Version 02 Issue 07/2022

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Country of Origin

Germany

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1. Introduction

1.1 General guidelines

These operating instructions describe how to set up, operate, clean and adjust the VWR® Ultra-Low Temperature Freezers. They apply to these models:

- VWR® ULT Freezer 352 Eco Premium
- VWR® ULT Freezer 528 Eco Premium

These operating instructions are intended for staff using the equipment in the laboratory.

Other service and maintenance activities should be carried out exclusively by Avantor Services, and are therefore not explained in this manual.

1.2 Operating manual

This operating manual is part of the components of delivery. Always keep it handy for reference in the vicinity of the chamber. If selling the unit, hand over the operating manual to the purchaser.

For the correct operation of the VWR® ULT Freezer, it is important that you read this operating manual completely and carefully and observe all instructions as indicated. Failure to read, understand and follow the instructions may result in personal injury. It can also lead to damage to the chamber and/or poor equipment performance.

To avoid injuries and damage observe the safety instructions of the operating manual. Failure to follow instructions and safety precautions can lead to significant risks.

DANGER

Dangers due to failure to observe the instructions and safety precautions.

Serious injuries and chamber damage. Risk of death.

- ➢ Observe the safety instructions in this Operating Manual.
- ➢ Follow the operating procedures in this Operating Manual.
- ➢ Carefully read the complete operating instructions of the chamber prior to installing and using the chamber.
- ➢ Keep the operating manual for future reference

Make sure that all persons who use the chamber and its associated work equipment have read and understood the Operating Manual.

This Operating Manual is supplemented and updated as needed. Always use the most recent version of the Operating Manual. When in doubt, call the Avantor Customer Service in your country for information on the up-to-dateness and validity of this Operating Manual.

1.3 Legal considerations

This operating manual is for informational purposes only. It contains information for correct and safe installing, start-up, operation, decommissioning, cleaning and maintenance of the product. Note: the contents and the product described are subject to change without notice.

Understanding and observing the instructions in this operating manual are prerequisites for hazard-free use and safety during operation and maintenance. Images are to provide basic understanding. They may deviate from the actual version of the chamber. The actual scope of delivery can, due to optional or special design, or due to recent technical changes, deviate from the information and illustrations in these instructions this operating manual. In no event shall VWR be held liable for any damages, direct or incidental arising out of or related to the use of this manual.

This operating manual cannot cover all conceivable applications. If you would like additional information, or if special problems arise that are not sufficiently addressed in this manual, please contact the Avantor Customer Service in your country.

Furthermore, we emphasize that the contents of this operating manual are not part of an earlier or existing agreement, description, or legal relationship, nor do they modify such a relationship. All obligations on the part of VWR derive from the respective purchase contract, which also contains the entire and exclusively valid statement of warranty administration and the general terms and conditions, as well as the legal regulations valid at the time the contract is concluded. The statements in this manual neither augment nor restrict the contractual warranty provisions.

1.3.1 Compliance with local laws and regulations

The operator is responsible for applying for and obtaining the necessary regulatory approvals or other authorizations necessary to run or use the product in its local environment. VWR will not be held liable for any related omission or for not obtaining the required approval or authorization, unless any refusal is due to a defect of the product.

1.3.2 Warranty

VWR warrants that this product will be free from defects in material and workmanship for a period of two (2) years from date of delivery plus additional 3 years on the compressor. If a defect is present, VWR will, at its option and cost, repair, replace, or refund the purchase price of this product to the customer, provided it is returned during the warranty period. This warranty does not apply if the product has been damaged by accident, abuse, misuse, or misapplication, or from ordinary wear and tear. If the required maintenance and inspection services are not performed according to the manuals and any local regulations, such warranty turns invalid, except to the extent, the defect of the product is not due to such non-performance.

Items being returned must be insured by the customer against possible damage or loss. This warranty shall be limited to the aforementioned remedies. IT IS EXPRESSLY AGREED THAT THIS WARRANTY WILL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND IN LIEU OF THE WARRANTY OF MERCHANTABILITY.

1.4 Structure of the safety instructions

In this operating manual, the following safety definitions and symbols indicate dangerous situations in accordance with the standards ISO 3864-2 and ANSI Z535.6.

1.4.1 Word message panel structure

WARNING LEVEL	
Warning symbols and/or Prohibitory symbols and/or Imperative symbols	**Type / cause of hazard.** **Possible consequences.** ⃠ Instruction how to avoid the hazard: prohibition ➢ Instruction how to avoid the hazard: mandatory action

Observe all other notes and information not necessarily emphasized in the same way, in order to avoid disruptions that could result in direct or indirect injury or property damage.

1.4.2 Warning levels

Depending on the probability of serious consequences, potential dangers are identified with a signal word, the corresponding safety color, and if appropriate, the safety alert symbol.

DANGER
Indicates an imminently hazardous situation that, if not avoided, will result in death or serious (irreversible) injury.

WARNING
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious (irreversible) injury

CAUTION
Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor (reversible) injury

NOTICE
Indicates a potentially hazardous situation which, if not avoided, may result in damage to the product and/or its functions or of a property in its proximity.

1.4.3 Safety alert symbol

Use of the safety alert symbol indicates a **risk of injury**.
Observe all measures that are marked with the safety alert symbol in order to avoid death or injury.

1.4.4 Warning symbols used in this manual

	Electrical hazard		Pollution Hazard
	Very cold surface		Harmful substances
	Explosive atmosphere		Biohazard
	Stability hazard		Risk of corrosion and / or chemical burns

1.4.5 Prohibitory symbols used in this manual

	Do NOT touch
	Do NOT spray with water
	Do NOT climb

1.4.6 Imperative symbols used in this manual

	Mandatory regulation		Environment protection
	Read operating instructions		Wear protective gloves
	Disconnect the power plug		Wear safety goggles
	Lift with mechanical assistance		

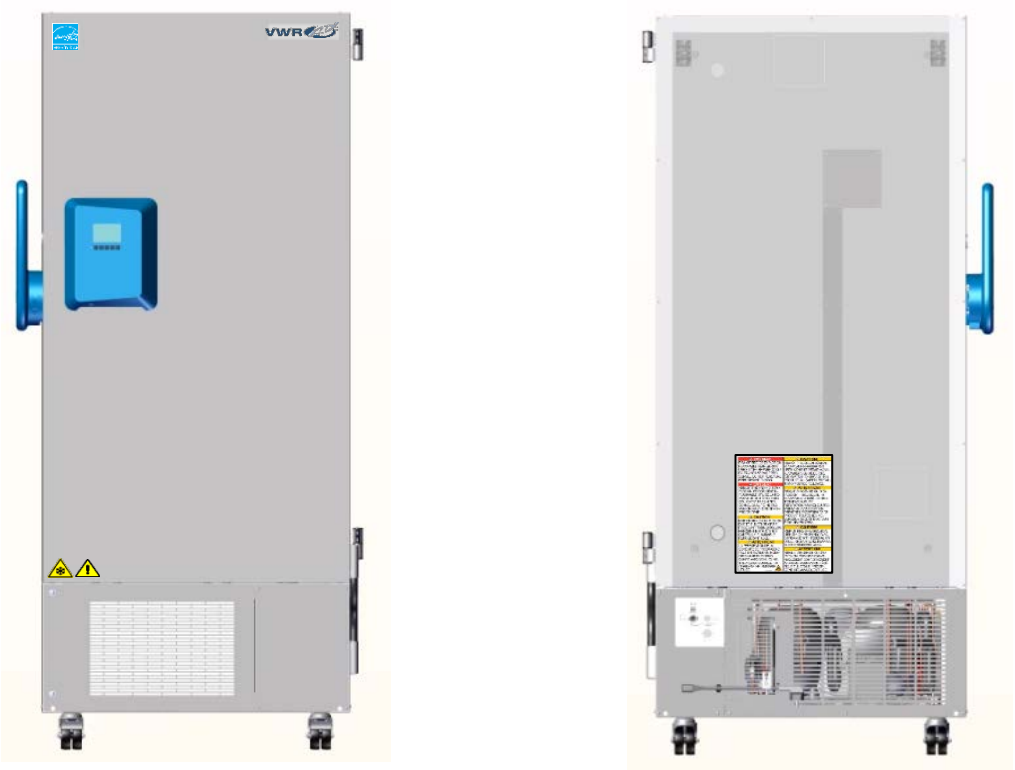
1.4.7 Information symbol used in this manual

	Information to be observed in order to ensure optimum function of the product

1.5 Localization / position of safety labels at the chamber

The following labels are located on the chamber:

Pictograms (Warning signs)		Information	
	Very cold surface: Risk of freezing		Energy Star Symbol
	Risk of injury. Observe the safety instructions in the operating manual.		Flammable refrigerants (only UL chambers)



VWR® ULT Freezer, Front VWR® ULT Freezer, rear view

Figure 1: Position of labels on the VWR® ULT Freezer

	Keep safety labels complete and legible.

Replace safety labels that are no longer legible. Contact Avantor Services for these replacements.

1.6 Type plate

The type plate sticks to the left side of the chamber, bottom right-hand.

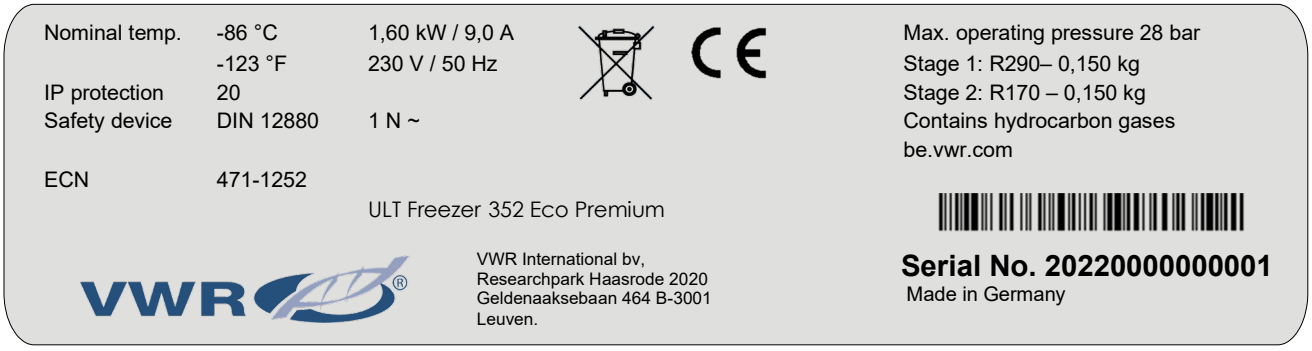


Figure 2: Type plate – example VWR ULT Freezer 352 Eco Premium

Figure 3: Type plate – example VWR ULT Freezer 352 Eco Premium-UL 120V

Indications of the type plate (example)

Indication		Information
Avantor by VWR		Manufacturer: VWR
ULT Freezer Eco Premium		Device name of the ultra-low temperature freezer
352 / 528		Model size, referring to the max. quantity of 2” boxes
Serial No.	000000000000	Serial no. of the chamber
Nominal temperature	-86 °C -123 °F	Nominal temperature
IP protection	20	IP type of protection acc. to standard EN 60529
Temp. safety device	DIN 12880	Temperature safety device acc. to standard DIN 12880:2006
ECN	471-1252	EU Cat. no. of the chamber
Part no.	76514-174	NA Cat. no. of the chamber
1,60 kW		Nominal power
9,0 A		Nominal current
230 V / 50 Hz		Nominal voltage +/- 10% at the indicated power frequency
1 N ~		Current type
Max. operating pressure 28 bar		Max operating pressure in the refrigerating system
Stage 1: R290 – 0,15 kg		Cooling 1st stage: Refrigerant type, filling weight
Stage 2: R170 – 0,15 kg		Cooling 2nd stage: Refrigerant type, filling weight
Contains hydrocarbon gases		Contains hydrocarbon gases

Symbols on the type plate

Symbol	Applies to	Information
CE	All models	CE conformity marking
	All models	Electrical and electronic equipment manufactured / placed on the market in the EU after 13 August 2005 and to be disposed of in a separate collection according to directive 2012/19/EU on waste electrical and electronic equipment (WEEE).
c UL us LISTED Laboratory Equipment E517296	UL models only	The chamber is certified by Underwriters Laboratories Inc.® according to the following standards: • UL 61010-1, 3rd Edition, 2012-05, Rev. 2016-04 • UL 61010-2-011, 1st Edition, 2017-01 • CAN/CSA-C22.2 No. 61010-1, 3rd Edition, 2012-05, Rev. 2016-04

1.7 UKCA Importer details

The sticker with UKCA Importer details sticks next to the type plate to the left side of the chamber, bottom right-hand.

Figure 4: Sticker with UKCA Importer details

Symbol on the sticker

Symbol	Applies to	Information
UK CA	All models except UL models	UKCA conformity marking

2. Safety

2.1 Personnel Qualification

The chamber must only be installed, tested, and started up by personnel qualified for assembly, startup, and operation of the chamber. Qualified personnel are persons whose professional education, knowledge, experience and knowledge of relevant standards allow them to assess, carry out, and identify any potential hazards in the work assigned to them. They must have been trained and instructed, and be authorized, to work on the chamber.

The chamber should only be operated by laboratory personnel especially trained for this purpose and familiar with all precautionary measures required for working in a laboratory. Observe the national regulations on minimum age of laboratory personnel.

2.2 General safety instructions on installing and operating the chamber

With regard to operating the chamber and to the installation location, please observe the local and national regulations relevant for your country (for Germany: DGUV guidelines 213-850 on safe working in laboratories, issued by the employers' liability insurance association).

VWR is only responsible for the safety features of the chamber provided skilled electricians or qualified personnel authorized by VWR perform all maintenance and repair, and if components relating to chamber safety are replaced in the event of failure with original spare parts.

To operate the chamber, use only original VWR accessories or accessories from third-party suppliers authorized by VWR. The user is responsible for any risk caused by using unauthorized accessories.

NOTICE

Danger of overheating due to lack of ventilation.

Damage to the chamber.

∅ Do NOT install the chamber in unventilated recesses.

➢ Ensure sufficient ventilation for dispersal of the heat.

➢ Observe the prescribed minimum distances when installing the chamber (chap. 4.5)

NOTICE

Danger to the environment by leakage of refrigerant in the event of a chamber defect.

Alteration of the environment.

➢ Ensure sufficient ventilation of the installation site.

Do not install or operate the chamber in hazardous locations.

DANGER

Danger of explosion due to combustible dusts or explosive mixtures in the vicinity of the chamber.

Serious injury or death from burns and / or explosion pressure.

∅ Do NOT operate the chamber in potentially explosive areas.

➢ KEEP combustible dust or air-solvent mixtures AWAY from the chamber.

The chamber does not dispose of any measures of explosion protection.

DANGER

Danger of explosion due to introduction of flammable or explosive substances in the chamber.

Serious injury or death from burns and / or explosion pressure.

∅ Do NOT introduce any substance into the chamber which is combustible or explosive at working temperature.

∅ Do NOT introduce any combustible dust or air-solvent mixture in the inner chamber.

Any solvent contained in the charging material must not be explosive or inflammable. I.e., irrespective of the solvent concentration in the steam room, NO explosive mixture with air must form. The temperature inside the chamber must lie below the flash point or below the sublimation point of the charging material. Familiarize yourself with the physical and chemical properties of the charging material.

Familiarize yourself with any potential health risks caused by the charging material. Take adequate measures to exclude any risk prior to putting the chamber into operation.

WARNING

Danger of intoxication and infection through contamination of the chamber with toxic, infectious or radioactive substances.

Damages to health.

- ➢ Protect the interior of the chamber against contamination by toxic, infectious or radioactive substances.
- ➢ Take appropriate measures when bringing in or taking out toxic, infectious or radioactive substances.

DANGER

Electrical hazard by water entering the chamber.

Deadly electric shock.

- ∅ The chamber must NOT become wet during operation, cleaning, or maintenance.
- ∅ Do NOT install the chamber in damp areas or in puddles.
- ➢ Set up the chamber in a splash-proof manner.

The chambers were produced in accordance with VDE regulations and were routinely tested in accordance to VDE 0411-1 (IEC 61010-1).

The inner surfaces become very cold during operation.

CAUTION

Danger of injury by freezing on when touching cold chamber parts during or after operation.

Local frostbite.

- ∅ Do NOT directly touch the inner surfaces or the charging material during operation.
- ∅ AVOID skin contact with the inner surfaces and accessory equipment.
- ➢ Wear protective gloves when opening the inner doors and during manipulation.

WARNING

Danger of injury and damages by the chamber tipping over or breakaway of the protruding lower housing cover.

Injuries and damage to the chamber and the charging material

- ∅ Do NOT climb on the lower housing cover.
- ∅ Do NOT load the lower housing cover with heavy objects while the chamber door is open.

2.3 Intended use

	Following the instructions in this operating manual and conducting regular maintenance work (chap. 22) are part of the intended use.

Any use of the chambers that does not comply with the requirements specified in this Operating Manual shall be considered improper use.

Other applications than those described in this chapter are not approved.

Use

Ultra-low temperature freezers “VWR® ULT Freezer” are technical equipment and intended solely for use at work. They are suitable are designed for safe storage of varied materials at temperatures up to -86 °C / *-122.8 °F*, especially for long-term storage of biological, medical, and chemical samples at constant low temperature. They are suitable for the domains Pharmacy, Medicine, Life Sciences, plastic industry, electronic components, food etc.

Freezers are designed for storage of harmless materials.

Requirements for the chamber load

The charging material shall not contain any corrosive ingredients that may damage the machine components made of stainless steel. Such ingredients include in particular acids and halides. Any corrosive damage caused by such ingredients is excluded from liability by VWR.

None of the components of the charging material must be able to form an explosive mixture with air. Any component of the charging material must NOT be able to release toxic gases.

The chamber does not dispose of any measures of explosion protection.

DANGER

Explosion or implosion hazard and danger of poisoning through the introduction of unsuitable loading material.

Poisoning. Serious injury or death from burns and / or explosion pressure.

- ∅ Do NOT introduce any substance combustible or explosive into the chamber, in particular no energy sources such as batteries or lithium-ion batteries.
- ∅ NO explosive dust or air-solvent mixture in the inner chamber.
- ∅ Do NOT introduce any substance which could lead to release of toxic gases.

Contamination of the chamber by toxic, infectious or radioactive substances must be prevented

WARNING

Danger of intoxication and infection through contamination of the chamber with toxic, infectious or radioactive substances.

Damages to health.

- ➢ Protect the interior of the chamber against contamination by toxic, infectious or radioactive substances.
- ➢ Take appropriate measures when bringing in or taking out toxic, infectious or radioactive substances.

In case of foreseeable use of the chamber there is no risk for the user through the integration of the chamber into systems or by special environmental or operating conditions in the sense of EN 61010-1:2010. For this, the intended use of the chamber and all its connections must be observed.

Medical devices

The chambers are not classified as medical devices as defined by Regulation (EU) No 2017/745.

Personnel Requirements

Only trained personnel with knowledge of the Operating Manual can set up and install the chamber, start it up, operate, clean, and take it out of operation. Service and repairs call for further technical requirements (e.g. electrical know-how), as well as knowledge of the service manual.

Installation site requirements

The chambers are designed for setting up inside a building (indoor use).

The requirements described in the Operating Manual for installation site and ambient conditions (Chap. 4.5) must be met.

	WARNING: If customer should use a chamber running in non-supervised continuous operation, we strongly recommend in case of inclusion of irrecoverable specimen or samples to split such specimen or samples and store them in at least two chambers, if this is feasible.

2.4 Foreseeable Misuse

Other applications than those described in chap. 2.3 are not approved.

This expressly includes the following misuses (the list is not exhaustive), which pose risks despite the inherently safe construction and existing technical safety equipment:

- Non-observance of Operating Manual
- Non-observance of information and warnings on the chamber (e.g. control unit messages, safety identifiers, warning signals)
- Installation, startup, operation, maintenance and repair by untrained, insufficiently qualified, or unauthorized personnel
- Missed or delayed maintenance and testing
- Non-observance of traces of wear and tear
- Insertion of materials excluded or not permitted by this Operating Manual.
- Non-compliance with the admissible parameters for processing or storing the respective material.
- Installation, testing, service or repair in the presence of solvents
- Installation of replacement parts and use of accessories and operating resources not specified and authorized by the manufacturer
- Bypassing or changing protective systems, operation of the chamber without the designated protective systems
- Non-observance of messages regarding cleaning and disinfection of the chamber.
- Spilling water or cleaning agent on the chamber, water penetrating into the chamber during operation, cleaning or maintenance.
- Cleaning activity while the chamber is turned on.
- Operation of the chamber with a damaged housing or damaged power cord
- Continued operation of the chamber during an obvious malfunction
- Insertion of objects, particularly metallic objects, in louvers or other openings or slots on the chamber
- Human error (e.g. insufficient experience, qualification, stress, exhaustion, laziness)

To prevent these and other risks from incorrect operation, it is recommended to issue operating instructions and Standard operating procedures (SOPs).

2.5 Residual Risks

The unavoidable design features of a chamber, as well as its proper field of application, can also pose risks, even during correct operation. These residual risks include hazards which, despite the inherently safe design, existing technical protective equipment, safety precautions and supplementary protective measures, cannot be ruled out.

Messages on the chamber and in the Operating Manual warn of residual risks. The consequences of these residual risks and the measures required to prevent them are listed in the Operating Manual. Moreover, the operator must take measures to minimize hazards from unavoidable residual risks. This includes, in particular, issuing operating instructions.

The following list summarizes the hazards against which this Operating Manual and the Service Manual warn, and specifies protective measures at the appropriate spots:

Unpacking, Transport, Installation

- Sliding or tilting the chamber
- Setup of the chamber in unauthorized areas
- Installation of a damaged chamber
- Installation of a chamber with damaged power cord
- Inappropriate site of installation
- Missing protective conductor connection

Normal operation

- Assembly errors
- Contact with cold surfaces on the housing and on the doors
- Emission of non-ionizing radiation from electrical operating resources
- Contact with live parts in normal state

Cleaning and Decontamination

- Penetration of water into the chamber
- Inappropriate cleaning and decontamination agents
- Enclosure of persons in the interior

Malfunction and Damage

- Continued operation of the chamber during an obvious malfunction or outage of the cooling system
- Contact with live parts during error status

Operation of a unit with damaged power cord

Maintenance

- Maintenance work on live parts.
- Execution of maintenance work by untrained/insufficiently qualified personnel
- Electrical safety analysis during annual maintenance not performed

Trouble-shooting and Repairs

- Non-observance of warning messages in the Service Manual
- Trouble-shooting of live parts without specified safety measures
- Absence of a plausibility check to rule out erroneous inscription of electrical components
- Performance of repair work by untrained/insufficiently qualified personnel
- Inappropriate repairs which do not meet the quality standard specified by VWR

- Use of replacement parts other than VWR original replacement parts
- Electrical safety analysis not performed after repairs

2.6 Operating instructions by operator

Depending on the application and location of the chamber, we recommend that the operator of the freezer provides the relevant information for safe operation of the chamber in a set of operating instructions.

	Keep this set of operating instructions with the chamber at all times in a place where they are clearly visible. They must be comprehensible and written in the language of the employees.

2.7 Measures to prevent accidents

The operator of the chamber must observe the locally applicable regulations for operating the chamber (for Germany: Occupational Safety Regulations. Operation of refrigeration chambers, heat pumps and cooling systems, GUV-R 500 chap. 2.35) and take precautions to prevent accidents.

Following measures have been taken by the manufacturer in order to prevent ignition and explosions:

- **Indications of the type plate**

  See operating manual chap. 1.6

- **Operating manual**

  An operating manual is available for each chamber.

- **Temperature monitoring**

  The chamber has a temperature display which can be read from outside.

  An additional temperature safety device is built into the chamber. A visual and an audible signal (buzzer) show exceeding of the temperature.

- **Safety, measurement and control devices**

  The safety, measuring, and control devices are easily accessible.

- **Electrostatic charge**

  The interior parts are grounded.

- **Non-ionizing radiation**

  Non-ionizing radiation is not intentionally produced, but released only for technical reasons by electrical equipment (e.g. electric motors). The machine has strong permanent magnets. If persons with active implants (e.g. pacemakers, defibrillators) keep a safe distance (distance of field source to implant) of 30 cm, an influence of these implants can be excluded with high probability.

- **Protection against touchable surfaces**

  Tested according to EN ISO 13732-3:2008.

- **Floors**

  See operating manual chap. 4.5 for installation

- **Cleaning**

  See operating manual chap. 22.

- **Examinations**

  UL chambers only: The chamber is certified by Underwriters Laboratories Inc.® according to the standards UL 61010-1, 3rd Edition, 2012-05, Rev. 2016-04; UL 61010-2-011, 1st Edition, 2017-01; CAN/CSA-C22.2 No. 61010-1, 3rd Edition, 2012-05, Rev. 2016-04

3. Chamber description

The VWR® ULT Freezers were produced with great care using the latest tools for development and production. They were optimized for safe long-term storage of samples in the ultra-low temperature range. You can operate the freezer in a temperature range from -86 °C / *-122.8 °F* up to -50 °C / *-58 °F*.

The freezers are available for several different voltages.

Lockable main switch (option)

An additional locking system with key for the freezer's main power switch is optionally available.

Controller

The efficient chamber controller is equipped with a multitude of operating functions, in addition to recorder and alarm functions. Set-point entry is easily accomplished directly via the chamber controller. Temperature setting is accurate to a tenth of a degree. The controller is mounted at the optimal height for operation.

The controller offers an error diagnostics system generating audible and visual warning and alarm messages. The controller provides password protection for the setting menus.

The controller monitors ambient temperature and issues an alarm if it exceeds an adjustable value.

Housing

The inner chamber and the inside of the insulated outer door are made of stainless steel (German material no. 1.4016, US equivalent AISI 430). The housing including all corners and edges is RAL 7035 varnished. The inner surfaces are smooth and therefore easy to clean. Easy front access permits filter cleaning without tools. Two 28 mm access port serve to introduce a sensor cable of a measuring device.

The buildup of ice in the door area is minimal due to perfect closing of the inner and outer doors. Precise spatial distribution of the cold in the interior ensures storage of all samples at an identical storage temperature. The prevention of thermal bridges protects against defrosting. The combination of vacuum insulation panels (V technology) and CFC-free polyurethane foaming maximizes the cold storage capacity.

The freezer has two compartment doors. You can insert stainless steel shelves are make optimum use of the interior. You can flexibly arrange the shelves to use the interior in a variable and optimum manner. Inventory racks (stainless steel storage racks with cryo boxes, chap. 21) are optionally available.

Castors with locks serve to move the freezer.

Cooling system

The powerful, energy-efficient and low-noise refrigerating machine uses the environmentally friendly "green" refrigerants R290 (propane) und R170 (ethane). They are completely free of HCFCs (hydrochlorofluorocarbons) and CFCs (chlorofluorocarbon).

Control of the two-stage refrigerating machine: The 1st stage cooling immediately turns on. In addition, the 2nd stage cooling turns on depending on the temperature.

Safety

Thanks to the standard overtemperature safety device, the set temperature is maintained also in case of a controller failure.

In case of power failure at -80 °C / -112 °F, a temperature of -60 °C / -76 °F will not be exceeded in an empty freezer for at least 3.5 hours, in a loaded freezer (measured with a 30 kg / *66 lb* water load) for approx. 7 hours.

Data monitoring and recording

The chamber is regularly equipped with a zero-voltage relay alarm output (chap. 15.5) for integration into customer systems.

The freezer is regularly equipped with an Ethernet interface (chap. 20.1) for computer communication, enabling monitoring via a network.

3.1 Chamber overview

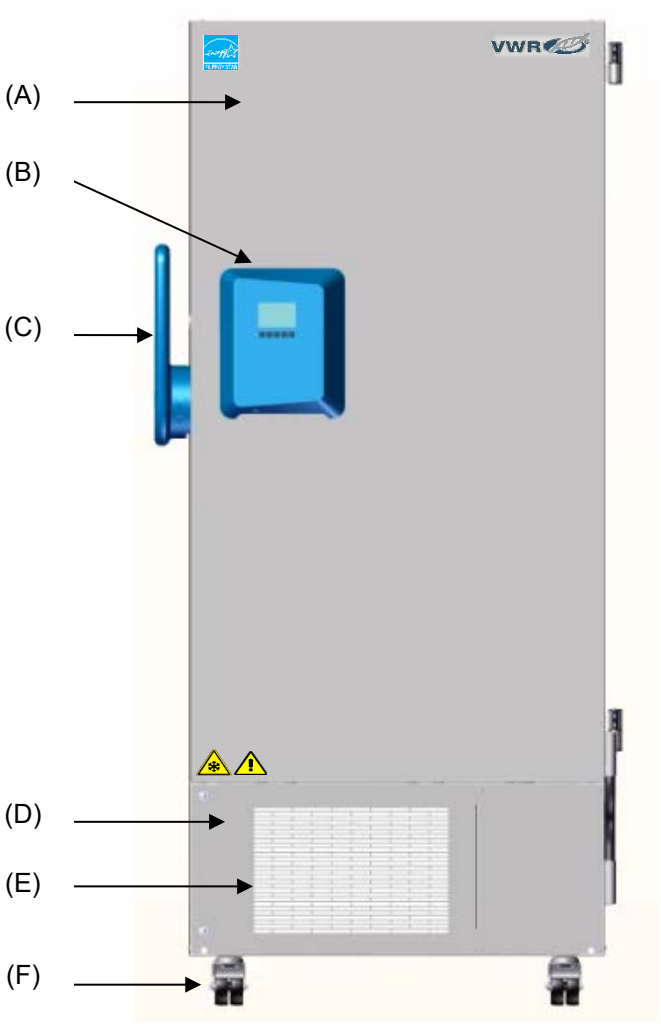


Figure 5: VWR® ULT Freezer 528 Eco Premium, front view

(A) Outer door
(B) Controller housing
(C) Door handle
(D) Compressor housing
(E) Air filter flap (checking and cleaning / replacing the filter chap. 23.3.1)
(F) Castors (front castors lockable by breaks)

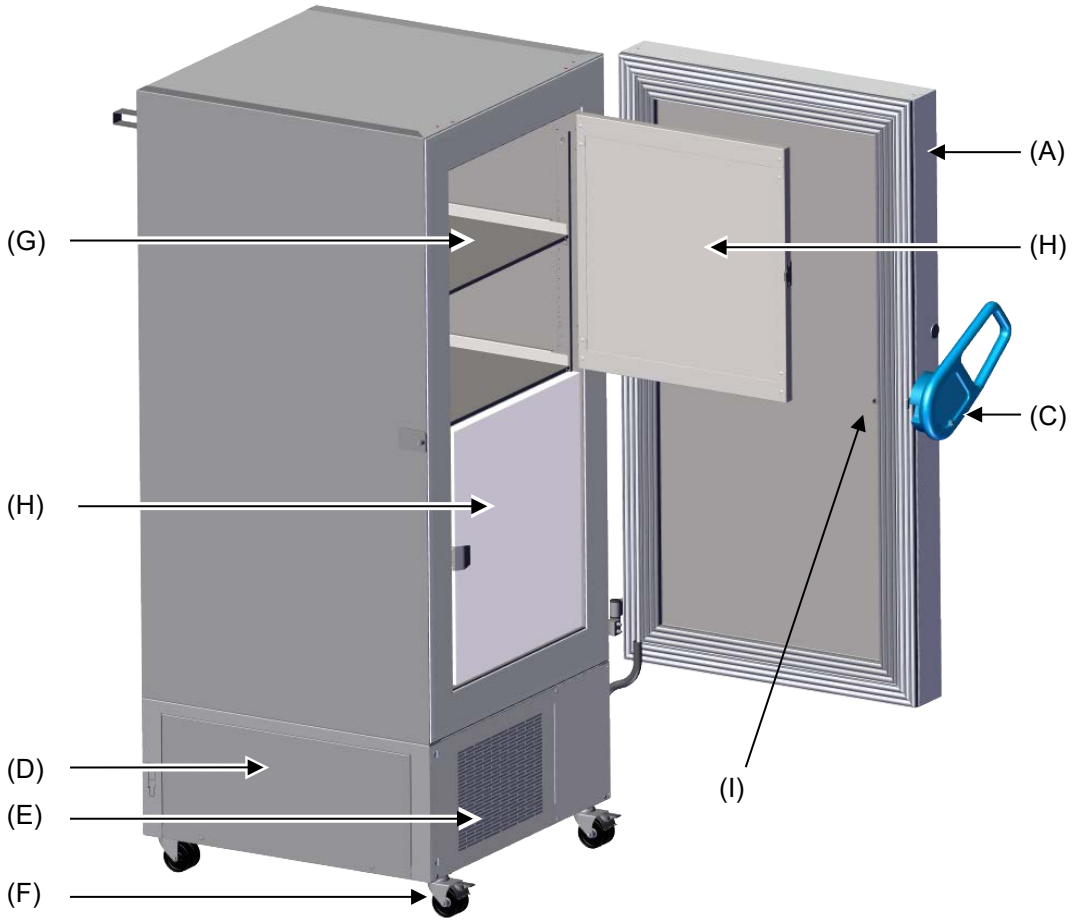


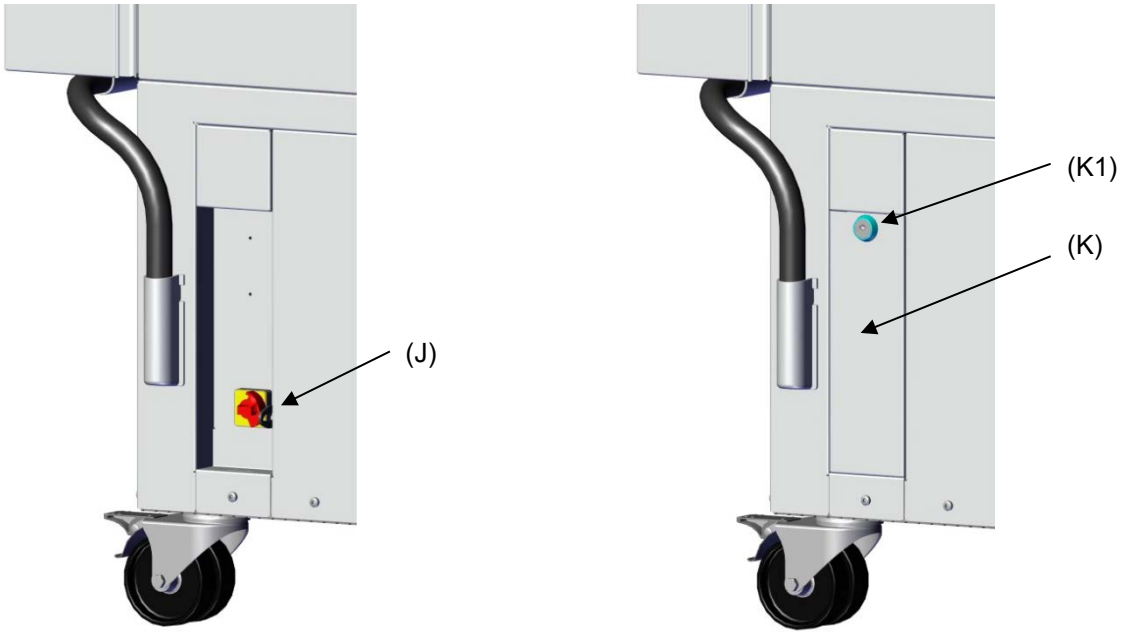
Figure 6: VWR® ULT Freezer 528 Eco Premium, open

(A) Outer door
(C) Door handle
(D) Compressor housing
(E) Air filter flap (checking and cleaning / replacing the filter chap. 23.3.1)
(F) Castors (front castors lockable by breaks)
(G) Compartment with variable shelf
(H) Compartment door
(I) Pressure compensation valve (inside of the door behind the controller housing)

3.2 Main power switch

The main power switch is located on the bottom right side of the chamber.

In addition, a lockable protective flap covering the main power switch is optionally available. It can be unlocked with a key and then removed.



Standard chamber | Chamber with Lockable main switch option

Figure 7: Position of the main power switch and the lockable protective flap (option) on the right side of the chamber

(J) Main power switch

(K) Lockable protective flap for the main power switch (optional)

(K1) Key lock of the optional lockable protective flap

Off | On

Figure 8: Main power switch (J) on the right side of the chamber

Lockable main switch	EU Cat. no.		NA Part no.	
	352	528	352	528
	471-1256	471-1256	76509-450	76509-450

3.3 Chamber rear

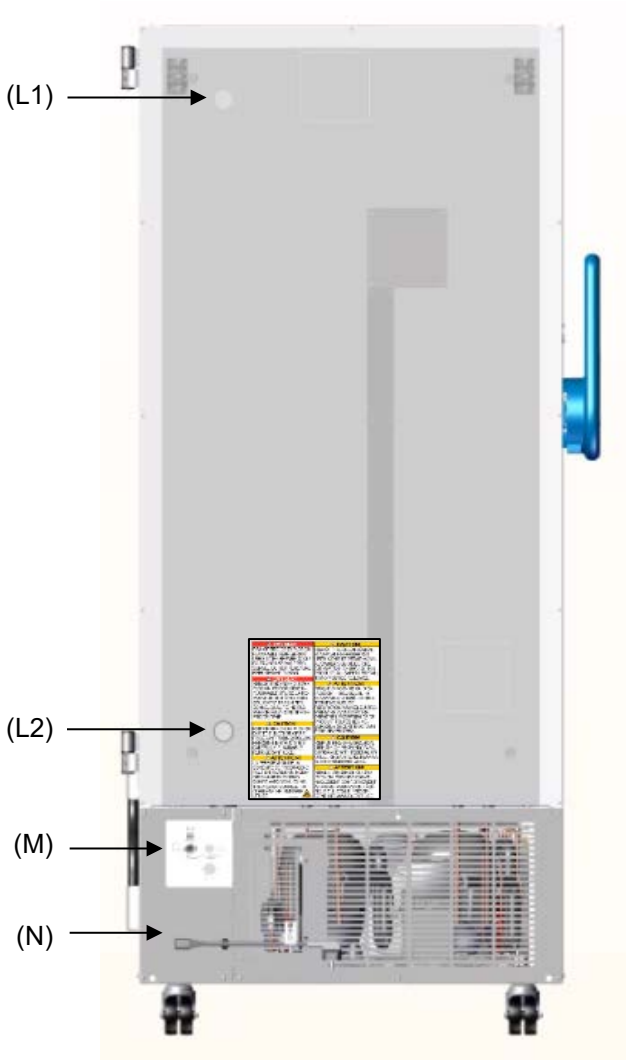


Figure 9: Chamber rear

(L1) 28 mm access port, e.g., for cable of a supplementary measuring device

(L2) 28 mm access port, e.g., for cable of a supplementary measuring device

(M) Connection panel with Ethernet interface and connection socket for zero-voltage relay alarm contact

(N) Connecting socket for IEC connector plug with strain relief

3.4 Doors

3.4.1 Outer door

The outer door must be closed while the chamber is operating normally in order to ensure stable conditions in the inner chamber.

	Delay time for the door open alarm: After closing the outer door, the door open alarm is switched off for a programmable delay time (factory setting: 1 minute).

3.4.2 Compartment doors

The freezer interior is divided into in 4 compartments, which are isolated against the surrounding with two doors. That permits bringing in or removing the samples of an individual compartment without remarkably affect temperature in the other compartments.

The compartment doors remain closed by magnetism when opening the outer door without need for closing them mechanically.

Open the inner doors as shortly as possible to avoid a temperature rise inside the freezer. The maximum angle of aperture is 100°.

For the additional thermal insulation and sealing of the interior compartment doors, you can order the option “compartment doors, insulated”. For this purpose, the compartment doors are filled with foam and thus additionally thermally insulated.

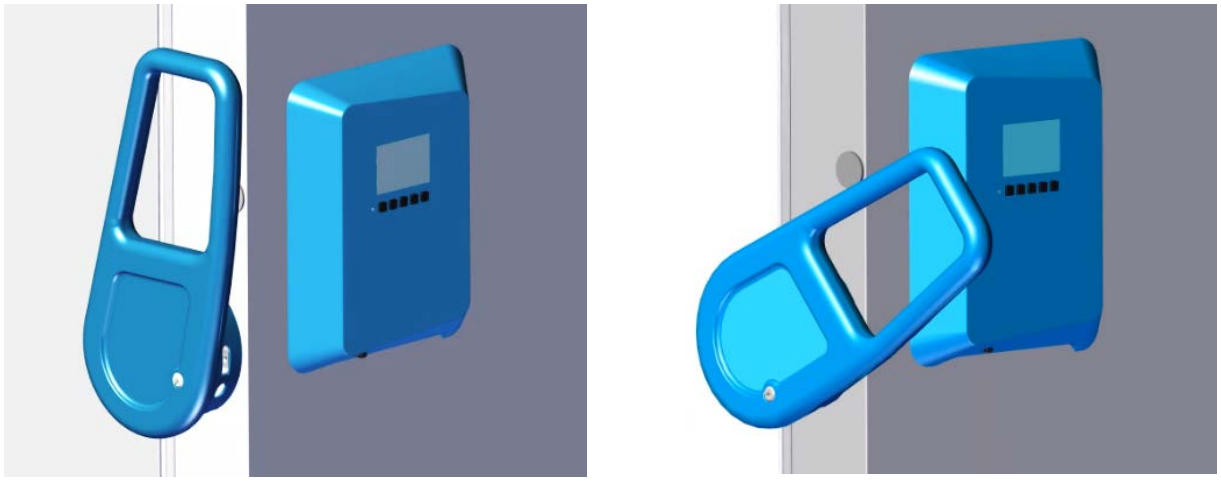
3.4.3 Controller housing

The controller operator panel is integrated in the freezer’s controller housing.

Figure 10: Controller housing (B) with controller operator panel

3.4.4 Door handle with door lock and eyelets for padlock

A door handle (C) serves to open and close the chamber door.



Closed door position | Open door position

Figure 11: Positions of the door handle (C)

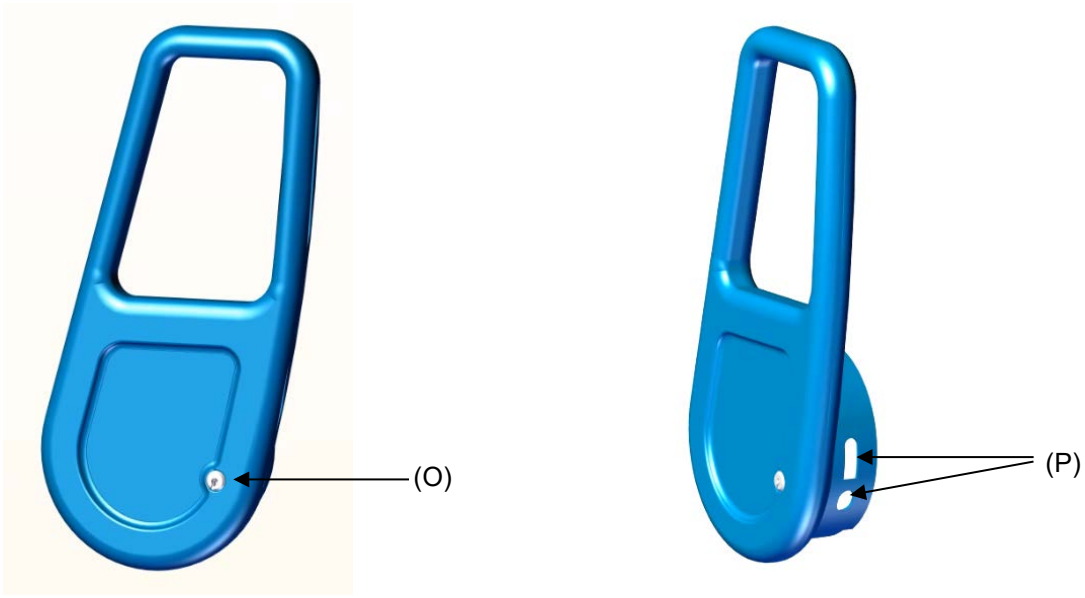


Figure 12: Door handle (C) with door lock and eyelets for padlock

(O) Door lock

(P) Eyelets for padlock

Operating the door lock / Lockable door handle

Chambers are equipped with a door lock (O), which is located in the door handle. Two keys are included. To lock the door lock, turn the key clockwise. The key can be removed in both positions (open / locked).

You can use the eyelets (P) to attach a padlock.

Recommended dimensions for a suitable padlock:

Thickness of shackle		Width of shackle		Height of shackle		Total height	
mm	inch	mm	inch	mm	inch	mm	inch
6	0,2	23	0,9	23,5	0,9	60	2,4

3.5 Drain well for condensate during defrosting (with deicing kit option)

The drain well collects the dripping water when defrosting. It is included with the deicing kit option:

Strong magnets on the drain well sides fix it on the chamber.

Attach the drain well to the freezer. Its first level rests on the lower housing panel. The gasket is aligned to the bottom edge of the freezer interior.

Figure 13: VWR® ULT Freezer with drain well (option)

While defrosting use adhesive tape to keep the door in drain off position right above the drain well. Now the melted condensate flows into the drain well.

Place a reservoir below the hole at the front left corner of the drain well, so that the water can drain off.

Deicing kit (complete set), consisting of • drain well for condensate, with gasket • Wiper (rubber to wipe off water) • Adhesive tape scratch • Ice scraper	**EU Cat. no.**		**NA Part no.**	
	352	**528**	**352**	**528**
	471-1257	471-1258	76509-452	76509-454

4. Completeness of delivery, transportation, storage, and installation

4.1 Unloading the VWR® ULT Freezer from the transport pallet

	Please proceed according to the Unloading Instructions supplied with the chamber. Caution: With deicing kit option, the drain well is placed under the chamber. Please remove it before unloading the freezer.

4.2 Unpacking, and checking equipment and completeness of delivery

After unpacking, please check the chamber and its optional accessories, if any, based on the delivery receipt for completeness and for transportation damage. Inform the carrier immediately if transportation damage has occurred.

CAUTION

Risk of injury and damages by sliding or tilting of the chamber due to improper lifting.

Injuries, damage to the chamber.

- ∅ Do NOT lift the chamber using the door, the door handle, the controller housing or the lower housing.
- ∅ Do NOT lift the chamber by hand.
- ∅ If possible, avoid transporting the chamber horizontally. It may be transported lying down ONLY on the hinge side or on its back, but must then stand upright for at least 24 hours before turning on.
- ➢ Lift the chamber using technical devices (fork lifter) from the pallet. Set the fork lifter laterally or from the rear in the middle of the chamber. Make sure to place all the lateral supports of the chamber on the forks (check: the fork protrudes at the opposite chamber side).
- ➢ Wear suitable shoes (safety shoes).

The final tests of the manufacturer may cause traces of the shelves on the inner surfaces. This has no impact on the function and performance of the chamber.

Please remove any transportation protection devices and adhesives in/on the chamber and on the doors and remove the operating manuals and accessory equipment.

	Remove any protective lamination sheet on the inner metal surfaces prior to commissioning.

	Wait at least 8 hours following transport with technical devices (chap. 4.3.2) before start-up.

If you need to return the chamber, please use the original packing and observe the guidelines for safe lifting and transportation (chap. 4.3).

For disposal of the transport packing, see chap. 25.1.

Scope of delivery

- VWR® ULT Freezer
- 3 shelves and 12 shelf holders with 6 screws
- DIN plug for the zero-voltage relay alarm output (connected)
- Set of 2 spacers for rear wall distance.
- Short user's manual with information where to download the operating manual

4.3 Guidelines for safe lifting and transportation

4.3.1 Moving the freezer inside a building

Before moving the freezer unlock the front castors. The castors are designed only for moving the freezer inside a building. This is possible only on a floor without joints (e.g. no tiles) and when avoiding shocks. In this case, the freezer must not be empty (max. load, see technical data, chap. 26.3).

If you want to move the chamber across a large door threshold or into an elevator to change the floor, empty the freezer and put all shelves on the bottom of the interior.

If you incline the chamber by less than 5°, you can directly turn it on after moving (at least 10 minutes after turning off). Otherwise, wait at least 8 hours until putting it into operation again.

As soon as the chamber has reached its destination, lock the front castors.

	Wear suitable shoes (safety shoes) when moving the freezer.

Over very short distances (within reach of the power cable), you can move the freezer while operating.

If you turned off the chamber (turning off at the main power switch, pulling the power plug), wait at least 10 minutes after moving until you turn on again the chamber in order to protect the refrigeration machine against damage.

	NOTICE
	Risk of damage to the refrigeration system due to too quick restart of the refrigeration machine after moving the chamber. **Damage to the chamber.** ➢ After moving the freezer wait 10 minutes before turning on the freezer again.

To move the freezer through narrow passages (doors, narrow corridors), open the chamber door:

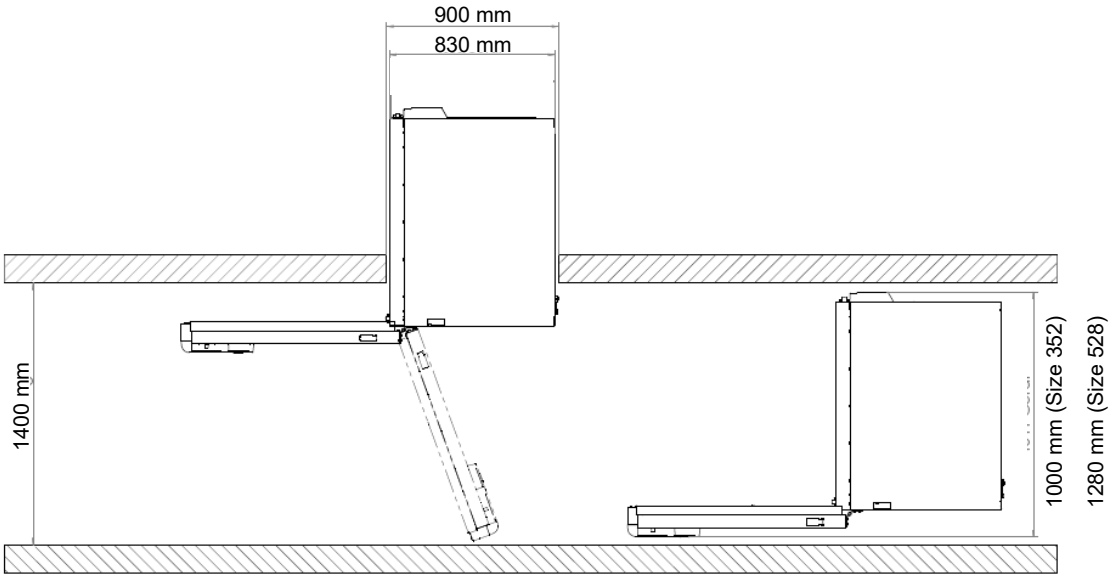


Figure 14: VWR® ULT Freezer with open chamber door

For transport outside a building use technical equipment (chap. 4.3.2).

4.3.2 Transport outside a building

Before moving the chamber unlock the front castors. The castors are designed only for moving the chamber inside a building (respect the information given in chap. 4.3.1).

After operation, please observe the guidelines for temporarily decommissioning the chamber (chap. 24).

CAUTION

Risk of injury and damages by sliding or tilting of the chamber due to improper transportation.

Injuries, damage to the chamber.

- ∅ Do NOT lift or transport the chamber using the door, the door handle, the controller housing or the lower housing.
- ∅ Do NOT lift the chamber by hand
- ∅ If possible, avoid transporting the chamber horizontally. It may be transported lying down ONLY on the hinge side or on its back, but must then stand upright for at least 24 hours before turning on.
- ➢ Transport the chamber only in its original packaging.
- ➢ Secure the chamber with transport straps for transport.
- ➢ Place the shelves on top of each other on the bottom of the interior.
- ➢ Lift the chamber using technical devices (fork lifter) and place it on the transport pallet. Set the fork lifter laterally or from the rear in the middle of the chamber. Make sure to place all the lateral supports of the chamber on the forks (check: the fork protrudes at the opposite chamber side).
- ➢ Transport chambers ONLY with the original transport pallet. Set the fork lifter only to the pallet. Without the pallet the chamber is in imminent danger of overturning
- ➢ Wear suitable shoes (safety shoes).

- Permissible ambient temperature range for transport: -10 °C / *14 °F* to +60 °C / *140°F*.

For transport packaging and rolling pallets for transportation purposes, please go to www.vwr.com for contact information.

	Wear suitable shoes (safety shoes) during transport.

	Following transport, wait at least 8 hours until start-up.

4.4 Storage

Intermediate storage of the chamber is possible in a closed and dry room. Observe the guidelines for temporary decommissioning (chap. 24).

- Permissible ambient temperature range for storage: -10 °C / *14 °F* to +60 °C / *140°F*.
- Permissible ambient humidity: max. 70% r.h., non-condensing

Secure the chamber against unintentional rolling by locking the front castors.

The freezer must stand upright in order to avoid oil running out of the engine casing and resulting damages to the cooling system. Max. angle of inclination: 10°.

When after storage in a cold location you transfer the chamber to its warmer installation site, condensation may form in the inner chamber or on the housing. Before start-up, wait at least one hour until the freezer has attained ambient temperature and is completely dry. According to the type of transport that has taken place (chap. 4.3) you may have to wait at least 8 hours until start up.

4.5 Location of installation and ambient conditions

The freezer is designed for setting up inside a building (indoor use). Set up the chamber on a flat, even surface, free from vibration and in a well-ventilated, dry location. Lock the front castors and align the chamber using a spirit level. The site of installation must be capable of supporting the chamber's weight (see technical data, chap. 26.3).

NOTICE

Danger of overheating due to lack of ventilation.

Damage to the chamber.

∅ Do NOT install the chamber in unventilated recesses.

➢ Ensure sufficient ventilation for dispersal of the heat.

➢ Make sure that all ventilation openings are uncovered.

➢ Observe the prescribed minimum distances when installing the chamber.

NOTICE

Danger to the environment by leakage of refrigerant in the event of a chamber defect.

Alteration of the environment.

➢ Ensure sufficient ventilation of the installation site.

- Permissible ambient temperature range for operation: +18 °C / *64.4 °F* to +32 °C / *89.6 °F*. At elevated ambient temperature values, fluctuations in temperature can occur.

The ambient temperature should not be substantially higher than the indicated ambient temperature of +22 +/- 3 °C / *71.6 °F +/- 5.4 °F* to which the specified technical data relate. For other ambient conditions, deviations from the indicated data are possible.

Prevent the freezer from sucking warm air from other devices.

Avoid direct solar radiation on the chamber. Do not place the freezer in direct vicinity of chambers with a high heat emission.

- Permissible ambient humidity: 70% r.h. max., non-condensing.
- Installation height: max. 2000 m / *6561.7 ft* above sea level.

Minimum distances:

- between several chambers: 250 mm / 9.84 in
- Wall distance, rear: 100 mm / 3.94 in (spacer is supplied, see chap. 5.2)
- Wall distance, laterally, on the side without door hinge: 100 mm / 3.94 in
- Wall distance, laterally, on the side with door hinge: 240 mm / 9.45 in.
- Spacing above the chamber: 100 mm / *3.94 in*

Ventilation openings must not be blocked. Ensure a distance of at least 100 mm / *3.94 in* to the ventilation openings on the freezer's front and rear.

To completely separate the chamber from the power supply, you must disconnect the power plug. Install the chamber in a way that the power plug is easily accessible and can be easily pulled in case of danger.

With an increased amount of dust in the ambient air, clean the condenser fan (by suction or blowing) several times a year. Check the condenser air filter frequently and clean it if necessary (chap. 23.3.1).

Avoid any conductive dust in the ambiance according to the chamber layout complying with pollution degree 2 (IEC 61010-1).

For the user there is no risk of temporary overvoltages in the sense of EN 61010-1:2010.

Do NOT install or operate the freezer in potentially explosive areas.

	**DANGER** **Danger of explosion due to combustible dusts or explosive mixtures in the vicinity of the chamber.** **Serious injury or death from burns and / or explosion pressure.** ∅ Do NOT operate the chamber in potentially explosive areas. ➢ KEEP combustible dust or air-solvent mixtures AWAY from the chamber.

5. Installation and connections

5.1 Operating instructions by operator

Depending on the application and location of the chamber, we recommend that the operator of the freezer provides the relevant information for safe operation of the chamber in a set of operating instructions.

	Keep the set of operating instructions with the chamber at all times in a place where they are clearly visible. They must be comprehensible and written in the language of the employees.

5.2 Spacers for rear wall distance

Please fix both spacers with the supplied screws at the chamber rear. This serves to ensure the prescribed minimum distance to the rear wall of 100 mm / *3.94 in*.

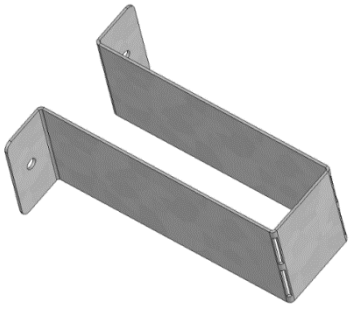


Figure 15: Spacer for rear wall distance

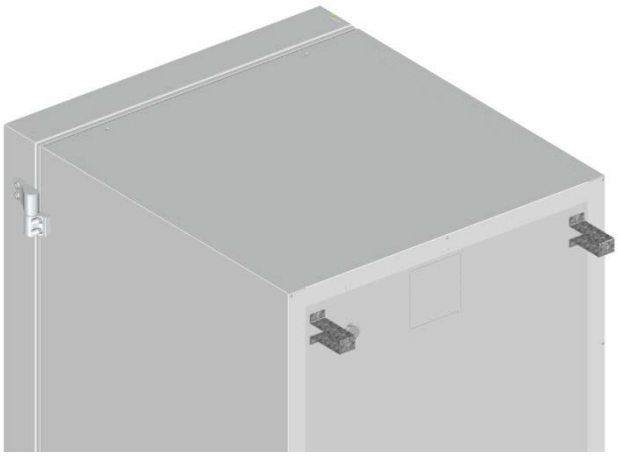


Figure 16: Rear VWR® ULT Freezer 528 with mounted spacers

5.3 Adjustable shelves

The scope of delivery comprises three adjustable shelves. You can mount them and further optional shelves in different positions of the lateral walls in 24 mm / *1 inch* steps. In standard position, the shelves are placed with a distance of 310mm / *12.2 in*, forming the bottom of the compartments, thus making available the maximum space for optional inventory systems.

It is required to fix the adjustable shelves in order to avoid that a person could be locked in the freezer. To remove a shelf, remove the screws, lift and incline the shelf and then pull it forward

Mounting the adjustable shelves:

- Insert the shelf holders at the desired height into shelf holder bars.
- Insert the shelves and screw them with a Phillips screwdriver to the shelf holders

Figure 17: Inserting the shelf holders

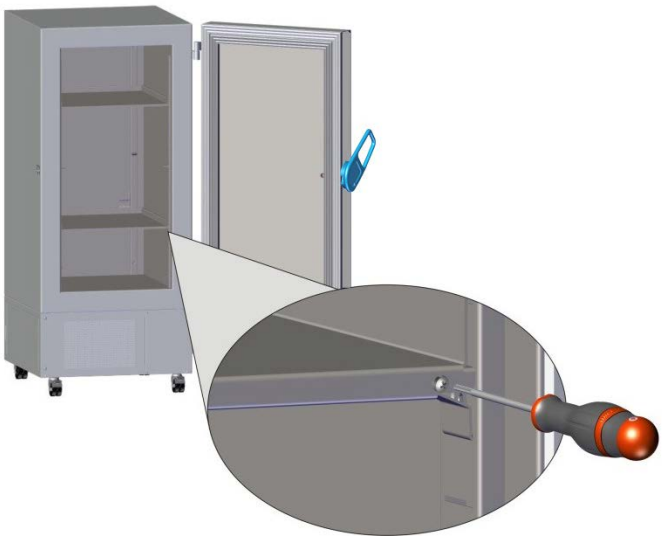
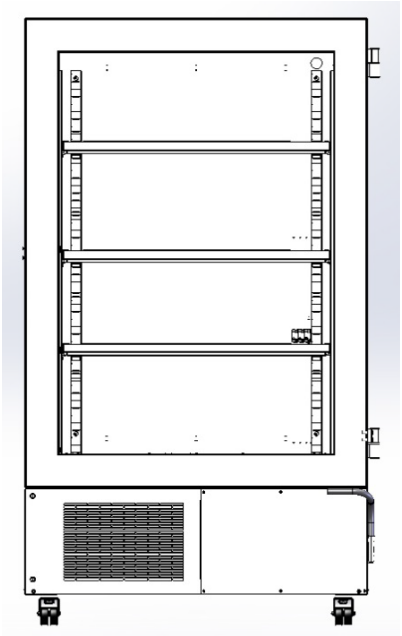


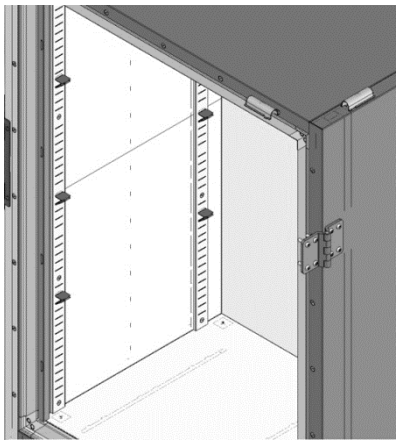
Figure 18: Screwing the shelves to the shelf holders

Recommended shelf position for optimal use of space:

Position of 3 shelves to obtain the maximum sample storage space:

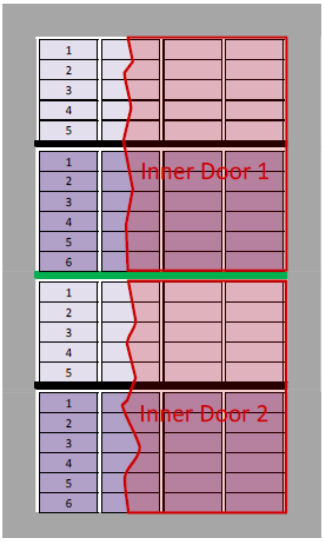
2 compartments with a ceiling height of 334 mm / *13.15 in* (for racks 6x4 (HXD))
2 compartments with a ceiling height of 279 mm / *11 in* (for racks 5x4 (HxD))





Insert the shelf holders into the following positions of the shelf holder bar (starting from the bottom):

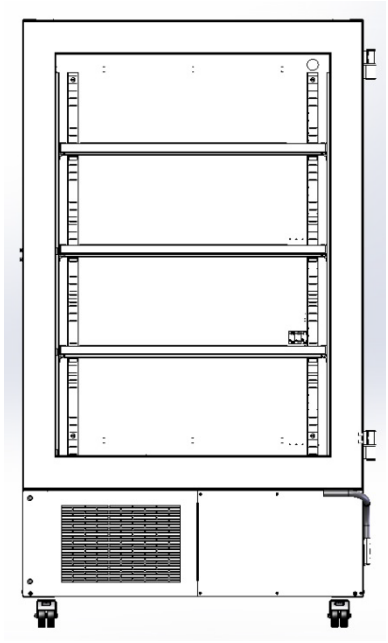
21, 36, 53

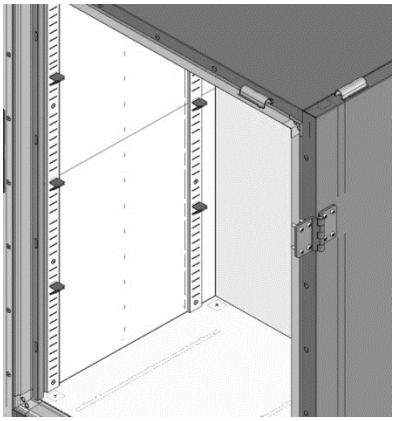


Height of 22 boxes (uneven)

Optional shelf positioning

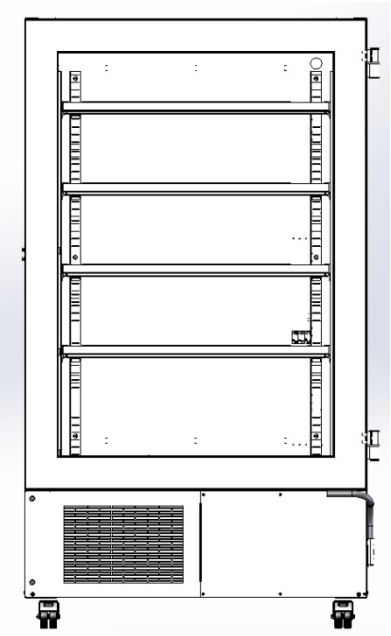
Position of 3 shelves to obtain 4 compartments with equal ceiling height

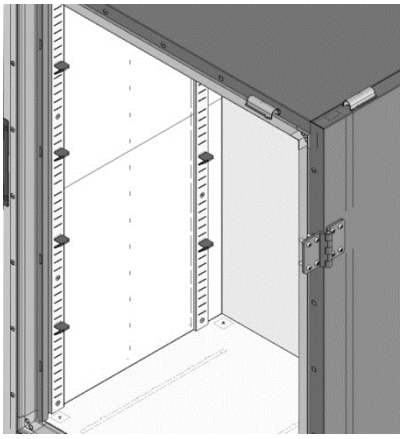




Insert the shelf holders into the following positions of the shelf holder bar (starting from the bottom):
18, 35, 53

Position of 4 shelves (1 x optional) to obtain 5 compartments with equal ceiling height





Insert the shelf holders into the following positions of the shelf holder bar (starting from the bottom):
13, 29, 42, 58

Permitted shelf loads:

Chamber size (referring to the max. quantity of 2” boxes)		**352**	**528**
Permitted load of individual shelf (regular)	kg / *lbs*	50 / *110*	50 / *110*
Permitted total load of all shelves (regular)	kg / *lbs*	200 / *441*	200 / *441*

If the upper shelf is loaded with maximum load, a minimum distance of 24 cm / *9.4 in* to the ceiling of the interior must be observed. Therefore, do not insert the shelf above position 59 (counted from bottom) of the shelf holder bar.

5.4 Electrical connection

VWR® ULT Freezers are supplied ready for connection and come with an IEC connector plug.

An internal overload release protects the freezer against excess-current.

Model	Plug of the power cable	Nominal voltage +/- 10% at the indicated power frequency	Current type	Fuse
VWR® ULT Freezer	Grounded plug EU, UK, CH	230 V at 50 Hz	1N~	10 A
VWR® ULT Freezer, UL model 120 V	NEMA 5-15P	115 V at 60 Hz	1N~	13 A
VWR® ULT Freezer, UL model 208 V	NEMA 6-15P	208-230 V at 60 Hz	2~	10 A

- The domestic socket must also provide a protective conductor. Make sure that the connection of the protective conductor of the domestic installations to the chamber's protective conductor meets the latest technology. The protective conductors of the socket and plug must be compatible!

DANGER

Electrical hazard due to missing protective conductor connection.

Deadly electric shock

➢ Make sure that the chamber's power plug and the power socket match and securely connect the electrical protective conductors of the chamber and the house installation.

- Only use original connection cables.

  UL chambers: Use only a UL Listed Power supply cord (UL category ELBZ), SJT 3x14 AWG (2.08 mm²); C13L. For outside USA use a certified power supply cord according to national requirements.

- Prior to connection and start-up, check the power supply voltage. Compare the values to the specified data located on the chamber's type plate (located on the left-hand side of the chamber, bottom right-hand, chap. 1.6).

NOTICE

Danger of incorrect power supply voltage due to improper connection.

Damage to the chamber.

➢ Check the power supply voltage before connection and start-up.

➢ Compare the power supply voltage with the data indicated on the type plate.

- When connecting, please observe the regulations specified by the local electricity supply company as well as the local or national electrical regulations (VDE directives for Germany).
- Observe a sufficient current protection according to the number of devices that you want to operate. We recommend the use of a residual current circuit breaker.
- Pollution degree (acc. to IEC 61010-1): 2
- Over-voltage category (acc. to IEC 61010-1): II

See also electrical data (chap. 26.3).

To completely separate the chamber from the power supply, you must disconnect the power plug. Install the chamber in a way that the power plug is easily accessible and can be easily pulled in case of danger.

6. Functional overview of the chamber controller

The chamber controller controls the temperature inside the chamber:

You can enter the desired set point value in the "**Set points**" menu directly at the controller.

The controller offers various notifications and alarm messages with visual and audible indication. All controller settings remain valid until the next manual change. They are stored also after turning off the chamber.

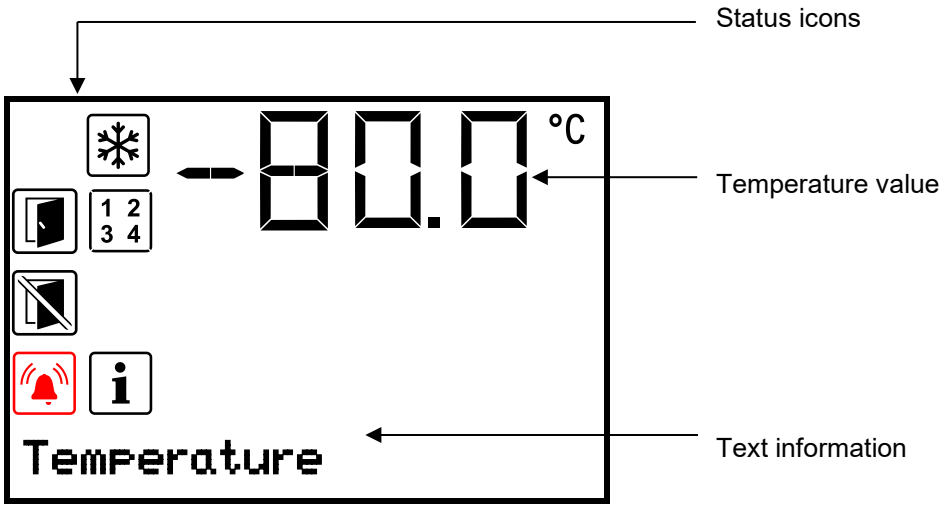


Figure 19: Normal display of the chamber controller (sample values)

Status icons in the controller display

Icon	Signification	Icon	Signification
	Door open		Collective alarm
	Do not open the door		Refrigeration active
	Information	1 2 3 4	Display of activated special controller functions. 3 = Service setpoint active

Functional controller keys

Icon	Signification	Function
	Arrow-up button	• Navigate between menus, submenus, other functions • In the setting menu: change setting, increase value
	Arrow-down button	• Navigate between menus, submenus, other functions • In the setting menu: change setting, decrease value
OK	***OK button***	• Select menu, submenu, function • In the setting menu: Confirm entry
	Back button	Back to previous menu level
	Standby button	no function

6.1 Menu structure of the controller and access levels

Starting from Normal display, navigate between the menus with the ***arrow buttons***.

With the ***OK button*** you enter the setting of further subordinate menu functions.

With the ***Back button*** you go back to the previous function and finally back to Normal display.

The available functions depend on the current dependent on the current **authorization** “User”, “Admin” or “Service”, for which the entry of a password may be required, depending on the setting.

You can set passwords for different access levels:

- **User:** The password enables access to the standard operating functions. Factory setting is 00 00 (no password assigned).
- **Admin:** The password enables access to advanced controller functions and settings. Factory setting is 00 01.
- **Service:** The password enables access to all controller functions (for Service only).

As soon as a password has been assigned, access to the respective functions is blocked and only available after entering the correct password.

Menu	Required access level	Functions
Setpoints	“User”	• Temperature set-point setting • Setting the safety controller • Activating/deactivating the service setpoint
Chamber info	Any user	• Configuration display (setup information, controller hardware and software) • Display of interface configuration (e.g. MAC address, IP address)
Settings	“Admin”	• General controller settings (date, time, menu language, temperature unit, display brightness…) • Network settings • Setting the data logger storage interval • Setting the tolerance range limits and delay times for door open and tolerance range alarm, setting the service set-point • Password changing for User and Admin
Service	“Service”	• Configuration settings (only for Service) • Password changing for User and Admin
USB	Export: Any user Import: “Admin”	• Export of configuration, logger, and service data • Import of configuration data

Unless noted otherwise, the figure in this manual show the functional range, which is available for the user with “Admin” authorization level

Note: When specifying the path to the respective function, the possibly required entry of a password is not listed.

7. Start up

	Following transport, wait at least 8 hours until start-up.

Check that the interior of the freezer is empty. Prior to starting a new freezer or if you do not know what the freezer was last used for, for hygiene purposes you should clean and disinfect the interior (chap. 22).

After connecting the supply lines, turn on the chamber by the main power switch (J) (position 1). The lit pilot lamp shows the chamber is ready for operation.

The controller shows normal display and controls the temperature to the last entered values.

7.1 Preset factory parameters

The chamber is supplied with the following preset parameters, which can be changed in the corresponding menus:

Temperature set point	-80 °C / *-112 °F*
Safety controller mode	Set point type “Limit”
Safety controller value	-50 °C / *-58 °F*
Maximum permitted deviation from the temperature set point for tolerance range alarm	+/- 5 K
Alarm delay time after opening the door	1 minute
Alarm delay time after leaving the tolerance range (Following opening the door or chamber startup, the tolerance range alarm becomes valid only after the setpoint has been reached)	60 minutes
Password for “User” authorization	0 (no locking)
Password for “Admin” authorization	1

7.2 Behavior after turning on the chamber

During the equilibration phase of approx. 8 hours after turning on the chamber, undefined temperature conditions occur within the chamber. During this phase, do not place any sample materials in the chamber

	NOTICE
	Danger of temperature fluctuation. **Destruction of samples.** ➢ Load the freezer only after equilibration of temperature.

If the function “Language selection at restart” has been activated (chap. 13.5, factory setting ON), the following settings are checked upon start up:

- **Menu language** (chap. 13.1):

  Use the ***arrow buttons*** to select the desired language, confirm with the ***OK button***

- **Temperature unit** (chap. 13.2):

  Use the ***arrow buttons*** to select the desired temperature unit, confirm with the ***OK button.***

- **Current date** (chap. 13.3), format DD MM YYYY:

  Use the ***arrow buttons*** to set the day, continue with the ***OK button***.

  Use the ***arrow buttons*** to set the month, continue with the ***OK button***.

  Use the ***arrow buttons*** to set the year, confirm with the ***OK button***

- **Current time** (chap. 13.4), format HH:MM:

  Use the ***arrow buttons*** to set the hours, continue with the ***OK button***.

  Use the ***arrow buttons*** to set the minutes, confirm with the ***OK button***

Set the controller to the desired temperature set point (chap. 8) used to operate the freezer.

	As long as there is a difference between the actual and set value shown in the display, the intended operation of the chamber will not be ensured.

8. Temperature set-point entry

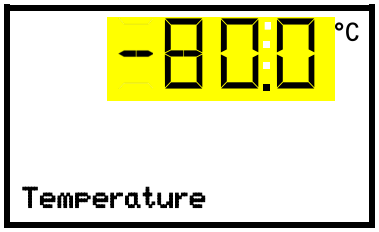
Required access level: “User”.

Setting and control range: -50 ºC / *-58 °F* up to -86 °C / *-122.8 °F*

To set a lower setpoint value for test purposes or for adjustment, you can enter and activate a service setpoint (chap. 19). This setting is outside the control range and is not intended for normal operation.

Path: **Normal display** ▽ **Setpoints** OK **Temperature**

Press the ***OK button*** to enable the setting.



Temperature setting.

The current setting flashes. Enter the desired set-point with the ***arrow buttons***.

Confirm the entry with the ***OK button***.

With the ***Back button*** you can go back to the “**Setpoints**” submenu and, repeatedly pressing it, to **Normal display**.

	With safety controller mode “Limit”, adapt the safety controller always when you changed the temperature set-point. Set the safety controller value by approx. 15 °C above the temperature set-point (chap. 12). Recommended setting: safety controller mode “Offset” with safety controller value 15 °C.

Only insert samples into the freezer when it has reached its stable operating state.

Temperature equilibrating time to -80 °C / *-112 °F* is approx. 6 hours (VWR® ULT Freezer 352) / approx. 7.5 hours (VWR® ULT Freezer 528).

9. Placing samples in storage in the freezer

Before storing valuable samples, conduct a 10-days test run at the desired temperature. This helps to detect transport damages like capillary cracks. Then you can load the freezer with the precooled samples.

	WARNING: If customer should use a freezer running in non-supervised continuous operation, we strongly recommend in case of inclusion of irrecoverable specimen or samples to split such specimen or samples and store them in at least two chambers, if this is feasible.

During the equilibration phase of approx. 8 hours after turning on the chamber, undefined temperature conditions occur within the chamber. During this phase, do not place any sample materials in the chamber

	NOTICE
	Danger of temperature fluctuation. **Destruction of samples.** ➢ Load the freezer only after equilibration of temperature.

When placing not precooled samples in storage, temperature rises inside the freezer. We recommend to successively load the freezer. The more thermal energy you bring in, the longer it takes until reaching the set-point temperature again.

Do not exceed the maximum load of each compartment and the permitted total load (see chap.26.3).

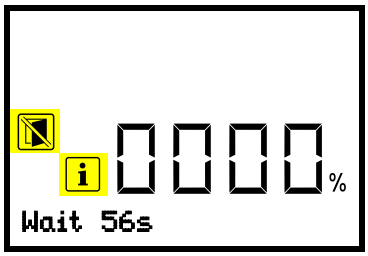
The inner surfaces become very cold during operation. Always wear protective gloves when opening the freezer and bringing in or removing material.

	CAUTION
	Danger of injury by freezing on when touching cold chamber parts during operation. **Local frostbite.** ∅ Do NOT directly touch the inner surfaces or the charging material during operation. ∅ AVOID skin contact with the inner surfaces and accessory equipment. ➢ Wear protective gloves when opening the inner doors and during manipulation.

After the outer door has been closed, it can only be opened again after a waiting time. This time depends dynamically on the length of time since the door was last opened:

- More than 7 days since the door was last opened: 90 seconds waiting time
- Less than 7 days but more than 24 hours since the door was last opened: 70 seconds waiting time
- Less than 24 hours since the door was last opened: 30 seconds waiting time

The waiting time is displayed on the controller in Normal display as a countdown. In addition, the information icon is lit, and the icon “Do not open the door” flashes.



Normal display during the waiting time after the outer door has been closed (example)

Note: If the door has not been opened for a longer period of time (more than 5 days), it is advisable to de-ice the door gaskets and the inner opening of the pressure compensation valve (I) (see chap. 23.3.3). After that, the door can be opened even after a short period of time without applying great force.

10. Setting special controller functions

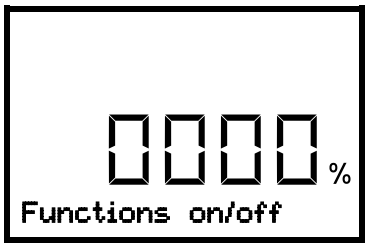
In the “Functions on/off” menu you can define the switching state of up to 4 controller functions.

Required access level: “User”.

Path: **Normal display** ▽ **Setpoints** OK ▽ **Functions on/off**

The functions are displayed from left to right.

Example: Function 1 activated = **1**000. Function 1 deactivated = **0**000.



Submenu “Functions on/off”.

This view shows the switching states of the four available functions.

“1” = Function activated

“0” = Function deactivated

Press the ***OK button*** to access the first individual function. With the ***arrow-down button*** you can proceed to the subsequent functions.

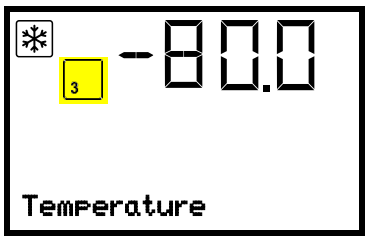
The functions 1, 2, and 4 are not available with this chamber type.

- Function 3 “Service setpoint on/off”: Activating the service setpoint, chap. 19.2

Press the ***OK button*** to enable the setting of the desired function and select the function’s switching state “1” (function activated) or “0” (function deactivated).

With the ***Back button*** you can go back to the “**Functions on/off**” submenu and, repeatedly pressing it, to **Normal display**.

In Normal display the activated functions are indicated by an icon showing the number of the respective function.



Example:

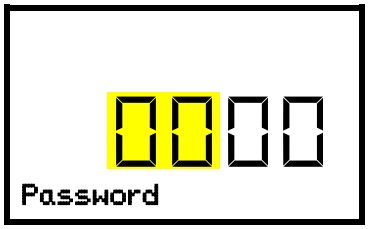
Normal display with activated function 3.

11. Password

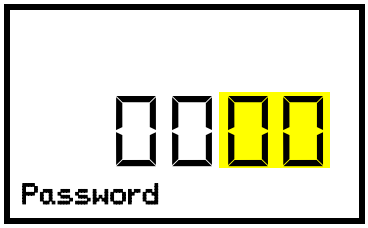
11.1 Password request

To access menus for which access is restricted, you must enter the corresponding password.

After calling the appropriate menu function with the ***OK button*** the password request appears.

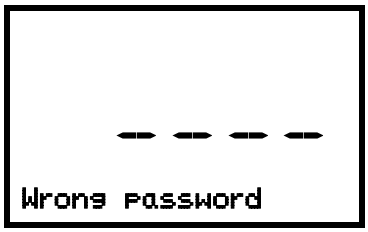


Password request.
The left two digits are flashing. Enter the desired numbers with the ***arrow buttons***.
Confirm the setting with the ***OK button***.



Password request.
The right two digits are flashing. Enter the desired numbers with the ***arrow buttons***.
Confirm the setting with the ***OK button***.

Upon entering an incorrect password, the message “Wrong password” is displayed.



Display “Wrong password”.
After 3 seconds the controller changes again to the password entry.
Enter the correct password.

Following correct password entry, you can access the desired menu function.

11.2 Assign and modify a password

In this menu you can assign and modify the passwords of the “User” and “Admin” access levels.

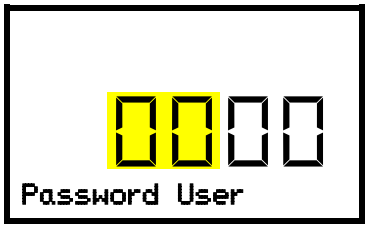
Required access level: “Admin”.

	Keep the password well in mind. There is no access to the corresponding menu functions without the correct password.

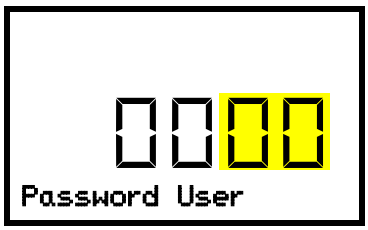
11.2.1 Assign and modify the User password

Path: **Normal display** ▽▽▽ **Settings** OK **Chamber** ▽▽▽▽ **Password User**

Press the ***OK button*** to enable the setting.



Setting the User password.
The left two digits are flashing. Enter the desired numbers with the ***arrow buttons***.
Confirm the setting with the ***OK button***.



Setting the User password.
The right two digits are flashing. Enter the desired numbers with the ***arrow buttons***.
Confirm the setting with the ***OK button***.

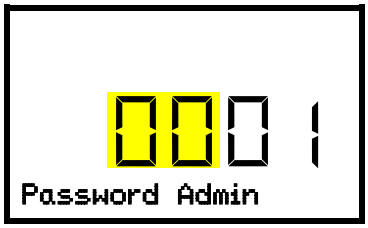
With the ***arrow-down button*** you can now proceed to enter the Admin password.

With the ***Back button*** you can go back to the "**Chamber**" submenu and, repeatedly pressing it, to **Normal display**.

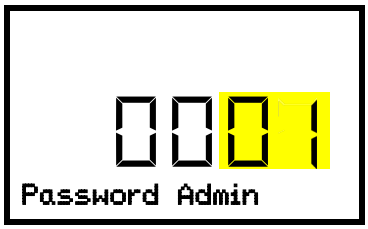
11.2.2 Assign and modify the Admin password

Path: **Normal display** ▽▽▽ **Settings** OK **Chamber** ▽▽▽▽▽ **Password Admin**

Press the ***OK button*** to enable the setting.



Setting the Admin password.
The left two digits are flashing. Enter the desired numbers with the ***arrow buttons***.
Confirm the setting with the ***OK button***.



Setting the Admin password.
The right two digits are flashing. Enter the desired numbers with the ***arrow buttons***.
Confirm the setting with the ***OK button***.

With the ***Back button*** you can go back to the "**Chamber**" submenu and, repeatedly pressing it, to **Normal display**.

11.3 Performance during and after power failure and shut down

During a power supply failure, all controller functions are shut down. The zero-voltage relay alarm output (chap. 15.5) in the rear connection panel (M) is switched for the whole duration of the power failure.

After the power returns or when turned on by hand, all functions return to the same status the chamber had before power failure. The freezer regulates the temperature to the last entered set point.

	All settings and set point values remain in the memory during power failure after power off.

If an alarm has occurred caused by the power supply failure (tolerance range, safety controller etc.), confirm the alarm. See chap. 15.

12. Safety controller (temperature safety device)

The VWR® ULT Freezer is equipped with an electronic over temperature safety device. It is designated as the “safety controller”. This second, electrically independent temperature controller takes over control at a selectable set point in case of fault. It serves to protect the charging material against excessively high temperatures. The safety controller is independent of the temperature control system. If an error occurs, it performs a regulatory function.

Please observe the regulations applicable to your country (for Germany: DGUV guidelines 213-850 on safe working in laboratories, issued by the employers’ liability insurance association).

The overtemperature safety controller serves to protect the chamber, its environment and the contents from exceeding the maximum permissible temperature. In the case of an error, it limits the temperature inside the chamber to the entered safety controller value. This condition (state of alarm) is indicated visually and additionally with an audible alert if the buzzer is enabled (chap. 15.3). The alarm persists until the chamber cools down below the configured safety controller value and the alarm is reset on the controller.

	Regularly check the safety controller setting. Set the safety controller set point by approx. 15 °C above the desired temperature set point.

	The safety controller only activates after the set-point has been reached once.

	The settings of the safety controller are inactive during open door and power failure. They become functional again following restitution of power supply and/or the restart of the chamber with the main power switch (J).

You can set the **safety controller mode** to “Limit” or “Offset”.

- **Limit:** Limit value, absolute maximum permitted temperature value

  This setting offers high safety as a defined temperature limit will not be exceeded. It is important to adapt the safety controller value after each modification of the temperature set-point. Otherwise, the limit could be too high to ensure efficient protection, or, in the opposite case, it could prevent the controller from reaching an entered set-point outside the limit range.

- **Offset:** Offset value, maximum overtemperature above any active temperature set point. The resulting maximum temperature changes internally and automatically with every temperature set-point change.

Example:

Desired temperature value: -86 °C, desired safety controller value: -60 °C.

Possible settings for this example:

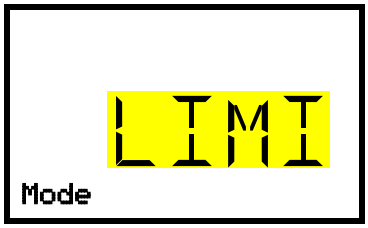
Temperature set point	Safety controller mode	Safety controller value
-86 °C	Limit	Limit value -60 °C
	Offset	Offset value 30 °C

12.1 Setting the safety controller mode

Required access level: “User”.

Path: **Normal display** ▽ **Setpoints** OK ▽ ▽ **Safety controller** OK **Mode**

Press the ***OK button*** to enable the setting.



Setting the safety controller mode

The current setting flashes. Use the ***arrow buttons*** to select between LIMI (Limit) and OFFS (Offset).

Confirm the setting with the ***OK button***.

With the ***arrow-down button*** you proceed to setting the safety controller value (chap. 12.2)

With the ***Back button*** you can go back to the “**Safety controller**” submenu and, repeatedly pressing it, to **Normal display**.

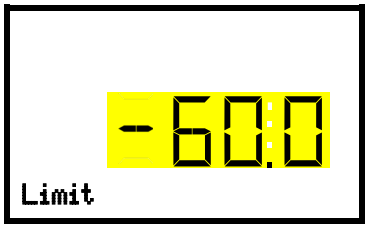
12.2 Setting the safety controller value

Required access level: “User”.

The desired safety controller mode must be selected first (chap. 12.1). Depending on the mode setting, one of the following setting menus will appear.

Path: **Normal display** ▽ **Setpoints** OK ▽ ▽ **Safety controller** OK ▽ **Limit** *or* **Offset**

Press the ***OK button*** to enable the setting.

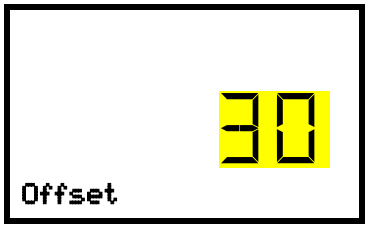


Setting the safety controller value with “Limit” safety controller mode.

The current value flashes. Enter the desired limit value with the ***arrow buttons***. Setting range: -20 °C to -110 °C.

Confirm the entry with the ***OK button***.

Or



Setting the safety controller value with “Offset” safety controller mode

The current value flashes. Enter the desired offset value with the ***arrow buttons***.

Confirm the entry with the ***OK button***.

With the ***Back button*** you can go back to the “**Safety controller**” submenu and, repeatedly pressing it, to **Normal display**.

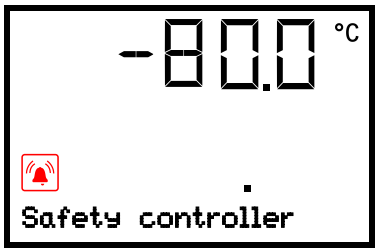
	Regularly check the settings of the safety controller mode and value. Set the safety controller value by approx. 15 °C above the desired temperature set-point.

12.3 Message and measures in the state of alarm

The state of alarm is indicated visually in Normal display. If the buzzer is enabled (chap. 15.3) there is an additional audible alert. A text message indicates the alarm cause. The “collective alarm” icon is lit. If the audible arm is activated, the buzzer sounds. Press the ***OK button*** to mute the buzzer.

The alarm message “Safety controller” and the “Collective alarm” icon are displayed on the controller until you press the ***OK button*** on the controller **and** the inner chamber temperature has cooled down below the safety controller value.

- If the inner chamber temperature has already cooled down below the safety controller value when pressing the ***OK button***, the alarm message “Safety controller” and the “Collective alarm” icon are reset together with the buzzer.
- If the state of alarm is still active when pressing the ***OK button***, i.e. the inner chamber temperature is still above the safety controller value, first only the buzzer is reset. The alarm message “Safety controller” and the “Collective alarm” icon will disappear as soon as the inner chamber temperature falls below the safety controller value.



Normal display showing safety controller alarm (sample value)

Note:

When the safety controller had been activated you should disconnect the chamber from the power supply and have an expert examine and rectify the cause of the fault.

12.4 Function check

Check the safety controller at appropriate intervals for its functionality. It is recommended that the authorized operating personnel should perform such a check, e.g., before starting a longer work procedure.

13. General controller settings

The general settings can be accessed in the "**Settings**" submenu, which is available for users with "Service" or "Admin" authorization level. It serves to enter date and time, select the language for the controller menus and the desired temperature unit and to configure the controller's communication functions.

The display of some network settings is available for all users in the "**Chamber info**" menu.

13.1 Selecting the controller's menu language

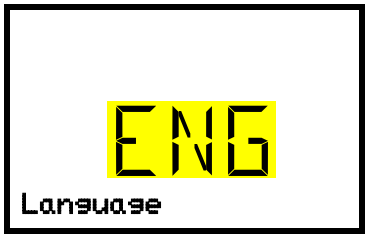
The controller communicates by a menu guide using real words in German, English, French, Spanish, and Italian languages.

Required access level: "Admin". Following start-up of the chamber (chap. 7), it is "User".

Path: **Normal display** ▽ ▽ ▽ **Settings** OK **Chamber** OK ▽ ▽ **Language***

* Following start-up of the chamber: **Sprache / Language / Langue / Idioma / Lingua**, depending on the language selected before turning off the chamber

Press the ***OK button*** to enable the setting.



Setting the menu language (example: English).

The current setting flashes. Use the ***arrow buttons*** to select the desired language.

Confirm the entry with the ***OK button***.

With the ***arrow-down button (twice)*** you can now change to the temperature unit setting.

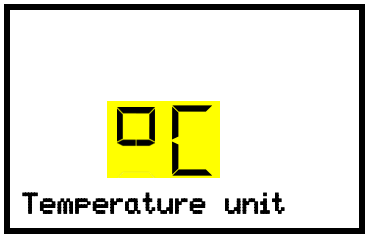
With the ***Back button*** you can go back to the "**Chamber**" submenu and, repeatedly pressing it, to **Normal display**.

13.2 Selecting the temperature unit

Required access level: "Admin". Following start-up of the chamber (chap. 7), it is "User".

Path: **Normal display** ▽ ▽ ▽ **Settings** OK **Chamber** OK ▽ ▽ ▽ ▽ **Temperature unit**

Press the ***OK button*** to enable the setting.



Setting the temperature unit

The current setting flashes. Use the ***arrow buttons*** to select between °C (degrees Celsius) and °F (degrees Fahrenheit).

Confirm the entry with the ***OK button***.

You can change the temperature unit between °C and °F.

If the unit is changed, all values are converted accordingly

C = degree Celsius	0 °C	= 31 °F	Conversion:
F= degree Fahrenheit	100 °C	= 212 °F	[value in °F] = [value in °C] ∗ 1,8 + 32

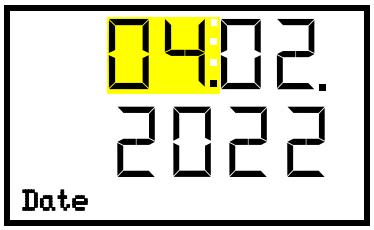
With the ***Back button*** you can go back to the "**Chamber**" submenu and, repeatedly pressing it, to **Normal display**.

13.3 Setting the current date

Required access level: “Admin”. Following start-up of the chamber (chap. 7), it is “User”.

Path: **Normal display** ▽ ▽ ▽ **Settings** OK **Chamber** OK **Date**

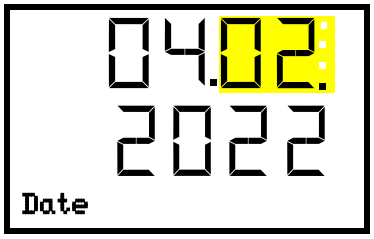
Press the ***OK button*** to enable the setting.



Setting the date: day

The current setting flashes. Enter the current day with the ***arrow buttons***.

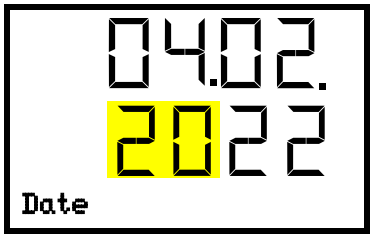
Confirm the entry with the ***OK button***.



Setting the date: month

The current setting flashes. Enter the current month with the ***arrow buttons***.

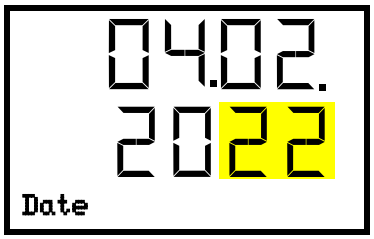
Confirm the entry with the ***OK button***.



Setting the date: year

The left two digits are flashing. Enter the first two digits of the current year with the ***arrow buttons***.

Confirm the entry with the ***OK button***.



Setting the date: year

The right two digits are flashing. Enter the last two digits of the current year with the ***arrow buttons***.

Confirm the entry with the ***OK button***.

With the ***arrow-down button*** you can now change to setting the current time.

With the ***Back button*** you can go back to the “**Chamber**” submenu and, repeatedly pressing it, to **Normal display**.

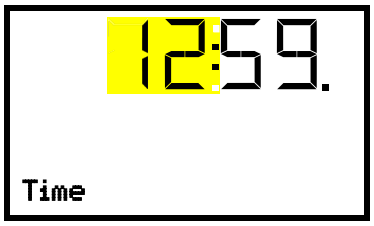
	Check the date when you use the chamber for the first time or when you change local summer time and adjust it if necessary.

13.4 Setting the current time

Required access level: “Admin”. Following start-up of the chamber (chap. 7), it is “User”.

Path: **Normal display** ▽ ▽ ▽ **Settings** OK **Chamber** OK ▽ **Time**

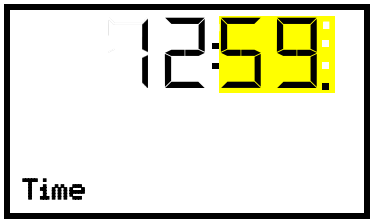
Press the ***OK button*** to enable the setting.



Setting the time: hours

The current setting flashes. Enter the current hour with the ***arrow buttons***.

Confirm the entry with the ***OK button***.



Setting the time: minutes

The current setting flashes. Enter the current minutes with the ***arrow buttons***.

Confirm the entry with the ***OK button***.

With the ***Back button*** you can go back to the “**Chamber**” submenu and, repeatedly pressing it, to **Normal display**.

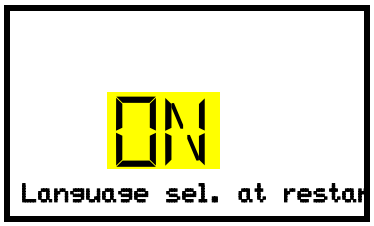
13.5 Function “Language selection at restart”

If the function “Language selection at restart” is activated, menu language, date, time, and temperature unit are checked with every startup of the chamber. At this occasion it is also possible to modify them with “User” access level.

Required access level: “Admin”.

Path: **Normal display** ▽ ▽ ▽ **Settings** OK **Chamber** OK ▽ ▽ ▽ **Language selection at restart**

Press the ***OK button*** to enable the setting.



Function “Language selection at restart”

The current setting flashes. Use the ***arrow buttons*** to select between ON and OFF.

Confirm the setting with the ***OK button***.

With the ***arrow-down button*** you can now change to the next parameter (chamber address).

With the ***Back button*** you can go back to the “**Chamber**” submenu and, repeatedly pressing it, to **Normal display**.

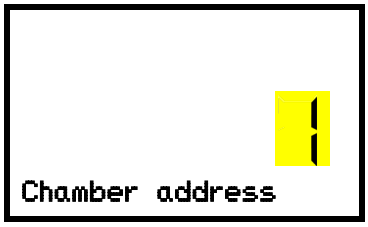
13.6 Setting the chamber address

This setting may be required for software communication.

Required access level: “Admin”.

Path: **Normal display** ▽ ▽ ▽ **Settings** OK **Chamber** OK ▽ ▽ ▽ ▽ ▽ **Chamber address**

Press the ***OK button*** to enable the setting.



Setting the chamber address

The current setting flashes. Enter the desired address with the ***arrow buttons***. Setting range: 1 up to 254

Confirm the entry with the ***OK button***.

With the ***arrow-down button*** you can now change to the next parameter (display brightness).

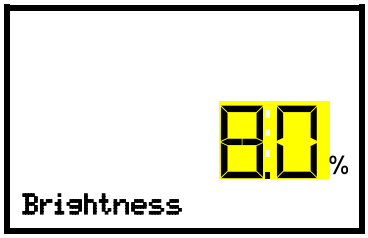
With the ***Back button*** you can go back to the “**Chamber**” submenu and, repeatedly pressing it, to **Normal display**.

13.7 Display brightness

Required access level: “Admin”.

Path: **Normal display** ▽ ▽ ▽ **Settings** OK **Chamber** OK ▽ ▽ ▽ ▽ ▽ ▽ **Brightness**

Press the ***OK button*** to enable the setting.



Setting the display brightness

The current setting flashes. Enter the desired value with the ***arrow buttons***. Setting range: 10% up to 100%

Confirm the entry with the ***OK button***.

With the ***arrow-down button*** you can now change to the next parameter (audible alarm, chap. 15.3).

With the ***Back button*** you can go back to the “**Chamber**” submenu and, repeatedly pressing it, to **Normal display**.

14. Tolerance range and alarm delay settings

In this menu you can define the deviation between the actual value and setpoint of, which that shall cause a tolerance range alarm. The entered value defines the limit of permitted deviations from the set-point (exceeding and falling below). Reaching this limit triggers tolerance range alarm.

In addition, you can specify delay times for the tolerance range alarm and the door open alarm.

During the delay time there is no alarm message after leaving the tolerance range:

- After door opening: fixed delay time of 1 hour
- After turning on the chamber or returning power supply: fixed delay time of 12 hours
- After leaving the tolerance range in normal operation: adjustable delay time (chap. 14.2)

If the actual value is outside the tolerance range, after the configured alarm delay time the alarm message “Temperature range” is displayed in Normal display (chap. 15.1). If the alarm buzzer is activated (chap. 15.3) there is an audible alert.

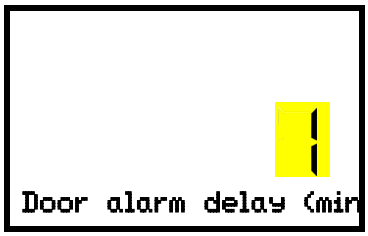
This function only activates after the set-point has been reached once.

Required access level: “Admin”.

14.1 Setting the delay time for door open alarm

Path: **Normal display** ▽ ▽ ▽ **Settings** OK ▽ ▽ ▽ **Various** OK **Door alarm delay (min)**

Press the ***OK button*** to enable the setting.



Setting the door alarm delay.

The current setting flashes. Use the ***arrow buttons*** to enter the desired time after which the door open alarm shall be triggered. Entry range: 1 up to 600 minutes. Factory setting: 1 minute.

Confirm the entry with the ***OK button***.

With the ***arrow-down button*** you can now change to the tolerance range alarm delay setting.

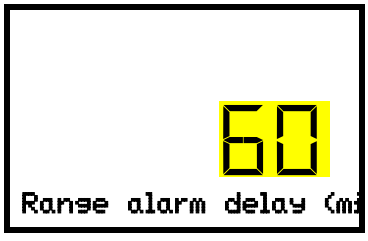
With the ***Back button*** you can go back to the “**Various**” submenu and, repeatedly pressing it, to **Normal display**.

14.2 Setting the delay time for tolerance range alarm

Following opening the door or chamber startup, the tolerance range alarm becomes valid only after the setpoint has been reached.

Path: **Normal display** ▽ ▽ ▽ **Settings** OK ▽ ▽ ▽ **Various** OK ▽ **Range alarm delay (min)**

Press the ***OK button*** to enable the setting.



Setting the tolerance range alarm delay.

The current setting flashes Use the ***arrow buttons*** to enter the desired time after which the range alarm shall be triggered. Entry range: 1 up to 300 minutes. Factory setting: 60 minutes.

Confirm the entry with the ***OK button***.

With the ***arrow-up button*** you can go back to the door alarm delay setting.

With the ***arrow-down button*** you can now change to the temperature tolerance range setting.

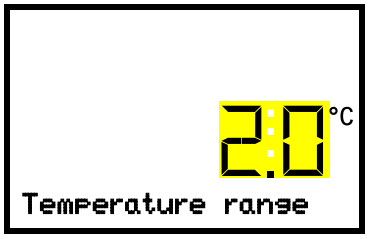
With the ***Back button*** you can go back to the “**Various**” submenu and, repeatedly pressing it, to **Normal display**.

14.3 Setting the temperature tolerance range

The temperature range is defined symmetrically around the setpoint. If the actual temperature value lies within this tolerance range and subsequently leaves and the tolerance range, tolerance range alarm is triggered after the set adjustable delay time (chap. 14.2)

Path: **Normal display** ▽ ▽ ▽ **Settings** OK ▽ ▽ ▽ **Various** OK ▽ ▽ **Temperature range**

Press the ***OK button*** to enable the setting.



Setting the temperature tolerance range

The current setting flashes. Enter the desired temperature range with the ***arrow buttons***. Entry range: 1,0 °C up to 10,0 °C. Factory setting: +/- 5 K

Confirm the entry with the ***OK button***.

With the ***arrow-up button*** you can go back to the tolerance range alarm delay setting.

With the ***arrow-down button*** you can now change to the service setpoint setting (chap. 19.1).

With the ***Back button*** you can go back to the "**Various**" submenu and, repeatedly pressing it, to **Normal display**.

15. Alarm functions

15.1 Alarm messages

	WARNING: If customer should use a chamber running in non-supervised continuous operation, we strongly recommend in case of inclusion of irrecoverable specimen or samples to split such specimen or samples and store them in at least two chambers, if this is feasible.

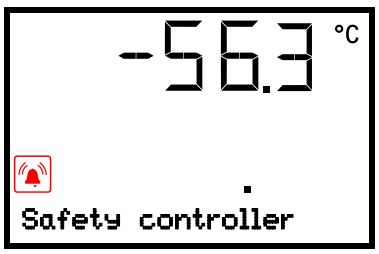
In the event of equipment failures, when the temperature deviates from the set tolerance range limits, optical and, if activated, acoustic alarm messages are given out via the controller. A zero-voltage relay alarm output (chap. 15.5) in the rear connection panel (M) permits transmission of the alarm e.g., to a central monitoring system.

The alarm messages door open and leaving the tolerance range are emitted after a configurable delay (chap. 14), the others immediately when the fault occurs. The tolerance range alarm is suppressed after opening the chamber door or turning on the freezer until the setpoint is reached and then for the selected delay time.

In Normal display a text message indicates the alarm cause. The "collective alarm" icon flashes. If the audible arm is activated, the buzzer sounds.

If more than one alarm signal is sent simultaneously, they are displayed in a cycle.

Press the ***OK button*** to confirm the alarm and mute the buzzer. If the alarm cause is still valid, the "collective alarm" icon is lit.



Alarm indication (example: safety controller alarm)

Alarm messages overview:

Condition	Alarm message	Moment of Alarm message and switching the zero-voltage relay alarm output
Chamber door open	“Door open”	after configurable time (chap. 14). Factory setting: 1 minute
Exceeded setpoint of the safety controller	“Safety controller”	immediately
The current actual temperature value is outside the tolerance range (chap. 14)	“Temp. range”	after configurable time (chap. 14). Factory setting: 60 minutes
Continuous compressor operation, refrigeration system defective. Contact Avantor Services.	“Continuous operation”	• 12 hours after start-up, if the set-point wasn’t reached • 60 minutes after reaching the set-point
Clean / replace the condenser air filter (chap. 23.3.1)	“Condenser temp.”	immediately
Compressor defective. Contact Avantor Services.	“Compressor defective”	immediately
Inner temperature sensor defective. Control continues using the safety controller temperature sensor	“Inner temp. sensor”	immediately
Safety controller temperature sensor defective	“Safety control sensor”	immediately
Inner temperature sensor and safety controller temperature sensor defective. Refrigeration is turned on permanently.	Temperature display shows “- - - - “ or “<-<-< “ or “>->->” Messages alternating: Inner temp. sensor and Safety control sensor	immediately
Failure of Pt100 temperature sensor on the condenser of the refrigerating machine. Refrigeration is turned on permanently.	“Condensate temp. sensor”	immediately
Failure of Pt100 temperature sensor on the cascade of the refrigerating machine.	“Cascade temp. sensor”	immediately
Failure of Pt100 temperature sensor for ambient temperature or air intake of the 1st stage cooling (refrigerating machine).	“Ambient temp. sensor”	immediately
Power failure	--	immediately (alarm output only)

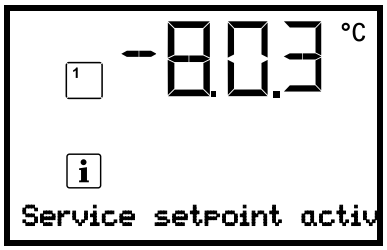
Press the ***OK button*** to confirm the alarm.

- Confirmation while the state of alarm persists: Only the buzzer is muted. The visual alarm message continues to be displayed until the alarm condition is removed. Then it is reset automatically.
- Confirmation after the alarm has ended: The buzzer and the visual alarm message are rest together.

15.2 Information messages

Information messages provide information about settings made.

In Normal display a text message indicates the condition. The “Information” icon is lit.



Information message (example: Service setpoint is active)

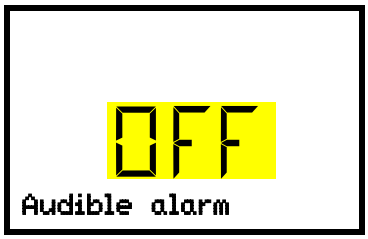
Information messages overview:

Condition	Information message	Moment of information message
Service setpoint is active	“Service setpoint active”	immediately

15.3 Activating / deactivating the audible alarm (alarm buzzer)

Path: **Normal display** ▽ ▽ ▽ **Settings** OK **Chamber** OK ▽ ▽ ▽ ▽ ▽ ▽ ▽ **Audible alarm**

Press the ***OK button*** to enable the setting.



Setting the audible alarm.

The current setting flashes. Use the ***arrow buttons*** to select between ON and OFF.

Confirm the setting with the ***OK button***.

With the ***Back button*** you can go back to the “**Chamber**” submenu and, repeatedly pressing it, to **Normal display**.

15.4 Required actions in case of an alarm

	Only qualified service personnel authorized by VWR must perform repair. Repaired chambers must comply with the VWR quality standards.

15.4.1 Safety controller temperature alarm

The selected temperature value of the safety controller was exceeded.

The alarm occurs immediately.

- Alarm message “Safety controller”, collective alarm icon
- Audible alarm (buzzer)
- Switching the zero-voltage relay alarm output

Actions:

- Check whether the outer door was open for a long time or is not closed properly. Close the door if necessary. With open door there can be additional door open alarm.
- Check the setting of the safety controller (chap. 12). The limit temperature should be approx. by 15 K above the temperature set point. If necessary, adjust the relevant value.
- Check whether samples were inserted into the freezer that may release heat.
- Check the ambient conditions. Protect the freezer from direct sunlight. Ensure sufficient ventilation around the installation location to prevent any buildup of heat in the chamber.
- If these points do not reveal the source of the fault, it may be that the chamber is faulty. Please contact Avantor Services.

15.4.2 Temperature tolerance range alarm (too high and too low temperature)

The tolerance range alarm becomes valid only after the setpoint has been reached.

When the actual temperature value leaves the tolerance range, the alarm occurs after the defined delay time (chap. 14). Factory setting: 60 minutes.

- Alarm message “Temp. range”, collective alarm icon
- Audible alarm (buzzer)
- Switching the zero-voltage relay alarm output

Actions:

- Factory setting is +/- 5 K.
- Use the actual temperature displayed on the controller to verify whether the temperature alarm threshold has been breached, i.e., too cold or too warm.

Temperature too low (under temperature alarm):

- Input of large quantities of samples which were precooled with liquid nitrogen. Reset the alarm with the ***OK button***.
- Possible cause: Continuous operation of the refrigeration machine after failure of one or several temperature sensors (chap. 15.4.5). In addition, there is continuous operation alarm. Contact Avantor Services.

Temperature too high (over temperature alarm):

- Check whether the outer door was open for a long time or is not closed properly. Close the door if necessary. In addition, there is door open alarm.
- Check the door gaskets for damage. Replace any damaged gaskets.
- Check whether there is icing around the gaskets. Defrost, if necessary.
- Check whether samples were inserted into the freezer that may release heat.
- Check the ambient conditions. Protect the freezer from direct sunlight. Ensure sufficient ventilation around the installation location to prevent any buildup of heat in the chamber.
- If these points do not reveal the source of the fault, it may be that the chamber is faulty. Please contact Avantor Services.

	If the same alarm recurs, please contact Avantor Services.

15.4.3 Door open alarm

The open and closed condition of the chamber door is controlled via the door contact switch. The temperature rise, when the door is opened, causes the refrigerating machine to turn on.

When the door is opened the alarm occurs after the defined delay time (chap. 14), factory setting: 1 minute.

- Alarm message “Door open”, collective alarm icon
- Audible alarm (buzzer)
- Switching the zero-voltage relay alarm output

Actions:

- Close the outer door.
- Use the ***OK button*** to switch off the buzzer even when the door is open.
- The alarm message is cancelled.
- The zero-voltage relay alarm output switches off.

15.4.4 Power failure alarm

- Switching the zero-voltage relay alarm output.

	WARNING: If customer should use a chamber running in non-supervised continuous operation, we strongly recommend in case of inclusion of irrecoverable specimen or samples to split such specimen or samples and store them in at least two chambers, if this is feasible.

15.4.5 Messages referring to temperature sensor failure

The alarms occur immediately.

- Audible alarm (buzzer)
- Switching the zero-voltage relay alarm output

Failure of the temperature sensor for interior measurement:

- Alarm message “Inner temp. sensor”, collective alarm icon
- Cause: defective inner temperature sensor
- Temperature control continues using the safety controller temperature sensor

Failure of the safety controller temperature sensor:

- Alarm message “Safety control sensor”, collective alarm icon
- Cause: defective safety controller temperature sensor

Failure of both the temperature sensors for interior measurement and the safety controller:

- Temperature display shows “- - - -” or “<-<-<” or “>->->”
- Alarm messages “Inner temp. sensor” and “Safety control sensor” alternating, collective alarm icon
- Cause: both the temperature sensors for interior measurement and the safety controller are defective
- Refrigeration is turned on permanently.

Failure of temperature sensors of the refrigerating machine:

- Alarm message “Condensate temp. sensor”, collective alarm icon

  Cause: defective temperature sensor on the condenser of the refrigerating machine
- Alarm message “Cascade temp. sensor”, collective alarm icon

  Cause: defective temperature sensor on the cascade of the refrigerating machine

  If this sensor fails, refrigeration is turned on permanently.
- Alarm message “Ambient temp. sensor”, collective alarm icon

  Cause: defective temperature sensor for ambient temperature or air intake of the 1st stage cooling

Actions:

- Please contact Avantor Services.
- If the temperature rises, i.e. the refrigerating machine is defective (safety controller temperature alarm and / or tolerance range alarm):
  - Transfer the material to another freezer.
  - Turn off the freezer.
  - If necessary, clean and disinfect the freezer.

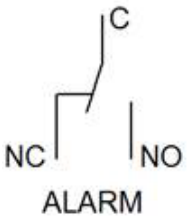
15.5 Zero-voltage relay alarm output

Collective alarm output via the zero-voltage relay alarm contact

The freezer is equipped with a zero-voltage relay output in the rear connection panel (M), which permits the transmission of alarms to an external monitoring system in order to monitor and record the alarm signals.

The zero-voltage relay alarm output switches immediately, as soon as the “Collective alarm” icon lights up. The zero-voltage relay alarm output switches for all alarm instances and in case of a power failure.

If the external alarm monitor is connected via the contacts C and NO, alarm monitoring will take place with protection against short-circuiting, i.e., if the connection between the freezer and the external alarm monitor is interrupted, an alarm is triggered. In this case, power failure will also trigger the alarm.



C = Pin 1
NC = Pin 2
NO = Pin 3

	C-NC	C-NO
Freezer on, no alarm	0	1
Freezer on, active alarm	1	0
Freezer off	1	0

Figure 20: Zero-voltage contacts circuit diagram and pin allocation of DIN socket

When the chamber is running and there is no alarm, contact C closes with contact NO.

When the chamber is turned off *or* if there is an active alarm, contact C closes with contact NC.

Maximum loading capacity of the switching contacts: 24V AC/DC – 2.0 Amp.

DANGER

Electrical hazard through overload of switching contacts.

Deadly electric shock, damage to switching contacts and connection socket.

∅ Do NOT exceed the maximum switching load of 24V AC/DC – 2.0 Amp.

∅ Do NOT connect any devices with a higher loading capacity.

The alarm message on the controller display remains displayed during transmission of an alarm via the zero-voltage relay outputs. As soon as the cause of the alarm is rectified, or the alarm message has been reset, the alarm transmission via the zero-voltage relay outputs is reset together with the alarm message on the controller display.

In case of power failure, transmission of the alarm via zero-voltage relay outputs remains active for the duration of the power failure. Afterwards, the contact closes automatically.

Connection to an external monitoring system

To ensure short-circuit-proof alarm monitoring that will trigger the alarm when the freezer is connected to an external alarm monitor, connect the external alarm monitoring system to the freezer via the connection socket of the zero-voltage relay output in the rear connection panel (M).

16. Ethernet network settings

The settings of this submenu are used for networking chambers with an Ethernet interface.

16.1 Showing the network settings

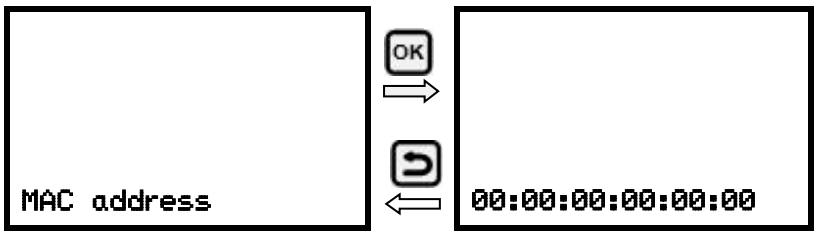
Required access level: “User”.

The “Ethernet” submenu offers to subsequently or individually access the following information:

- MAC address
- IP address
- Subnet mask
- Standard gateway
- DNS server address
- DNS chamber name

16.1.1 Showing the chamber’s MAC address

Path: **Normal display** ▽ ▽ **Chamber info** OK ▽ ▽ ▽ ▽ ▽ **Ethernet** OK **MAC address**



Display of the MAC address (example)

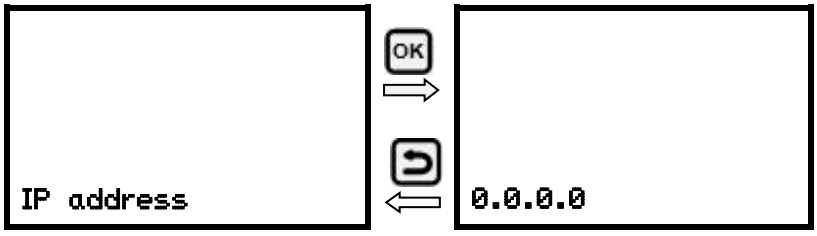
Toggle forth and back with the ***Back button*** and the ***OK button***.

With the ***arrow-down button*** you can now change to the next parameter (IP address).

With the ***Back button*** you can go back to the “**Ethernet**” submenu and, repeatedly pressing it, to **Normal display**.

16.1.2 Showing the IP address

Path: **Normal display** ▽ ▽ **Chamber info** OK ▽ ▽ ▽ ▽ ▽ **Ethernet** OK ▽ **IP address**



Display of the IP address (example)

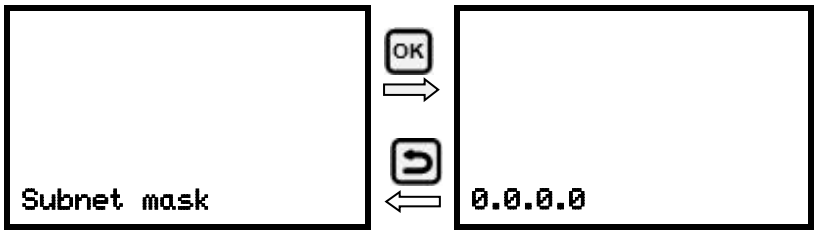
Toggle forth and back with the ***Back button*** and the ***OK button***.

With the ***arrow-down button*** you can now change to the next parameter (subnet mask).

With the ***Back button*** you can go back to the “**Ethernet**” submenu and, repeatedly pressing it, to **Normal display**.

16.1.3 Showing the subnet mask

Path: **Normal display** ▽ ▽ **Chamber info** OK ▽ ▽ ▽ ▽ ▽ **Ethernet** OK ▽ ▽ **Subnet mask**



Display of the subnet mask (example)

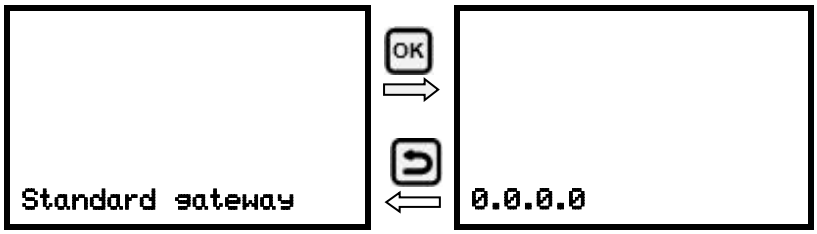
Toggle forth and back with the ***Back button*** and the ***OK button***.

With the ***arrow-down button*** you can now change to the next parameter (standard gateway).

With the ***Back button*** you can go back to the "**Ethernet**" submenu and, repeatedly pressing it, to **Normal display**.

16.1.4 Showing the standard gateway

Path: **Normal display** ▽ ▽ **Chamber info** OK ▽ ▽ ▽ ▽ ▽ **Ethernet** OK ▽ ▽ ▽ **Standard gateway**



Display of the standard gateway (example)

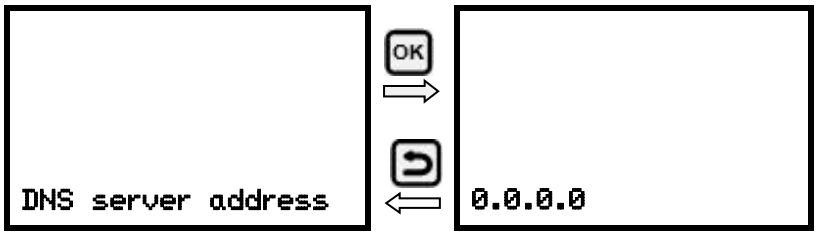
Toggle forth and back with the ***Back button*** and the ***OK button***.

With the ***arrow-down button*** you can now change to the next parameter (DNS server address).

With the ***Back button*** you can go back to the "**Ethernet**" submenu and, repeatedly pressing it, to **Normal display**.

16.1.5 Showing the DNS server address

Path: **Normal display** ▽ ▽ **Chamber info** OK ▽ ▽ ▽ ▽ ▽ **Ethernet** OK ▽ ▽ ▽ ▽ **DNS server address**



Display of the DNS server address (example)

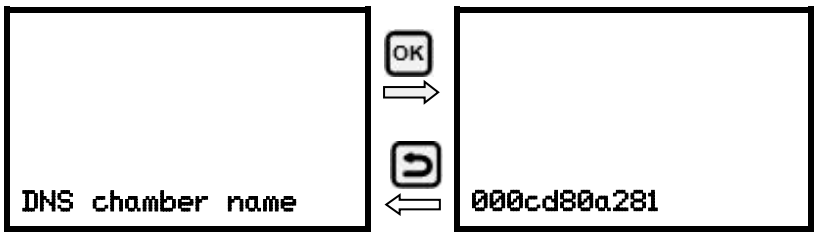
Toggle forth and back with the ***Back button*** and the ***OK button***.

With the ***arrow-down button*** you can now change to the next parameter (DNS chamber name).

With the ***Back button*** you can go back to the "**Ethernet**" submenu and, repeatedly pressing it, to **Normal display**.

16.1.6 Showing the DNS chamber name

Path: **Normal display** ▽ ▽ **Chamber info** OK ▽ ▽ ▽ ▽ ▽ **Ethernet** OK ▽ ▽ ▽ ▽ ▽ **DNS chamber name**



Display of the DNS chamber name (example)

Toggle forth and back with the ***Back button*** and the ***OK button***.

With the ***Back button*** you can go back to the "**Ethernet**" submenu and, repeatedly pressing it, to **Normal display**.

16.2 Changing the configuration of the network settings

Required access level: "Admin".

The "Ethernet" submenu offers to subsequently or individually access the following settings:

- Selecting the type of assignment (automatic or manual) of the IP address, chap. 16.2.1

If automatic IP address assignment has been selected:

- Selecting the type of assignment (automatic or manual) of the DNS server address, chap. 16.2.2

If manual IP address assignment has been selected:

- Assigning the IP address, chap. 16.2.3
- Assigning the subnet mask, chap. 16.2.4
- Assigning the standard gateway, chap. 16.2.5

If manual IP address assignment or manual DNS server address assignment has been selected:

- Assigning the DNS server address, chap. 16.2.6

16.2.1 Selecting the type of IP address assignment (automatic / manual)

Path: **Normal display** ▽ ▽ ▽ **Settings** OK ▽ **Ethernet** OK **IP address assignment**

Press the ***OK button*** to enable the setting

Selection of the type of assignment of the IP address.

The current setting flashes. Use the ***arrow buttons*** to select between AUTO (automatic) and MANU (manual).

Confirm the setting with the ***OK button***.

With the ***arrow-down button*** you can now change to the next parameter.

- If manual IP address assignment has been selected: assign the IP address (chap. 16.2.3)
- If automatic IP address assignment has been selected: select the type of assignment of the DNS server address (chap. 16.2.2).

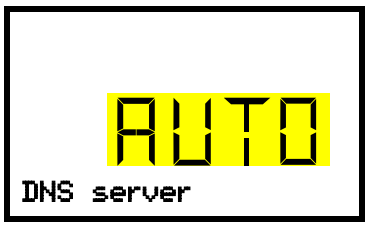
With the ***Back button*** you can go back to the "**Ethernet**" submenu and, repeatedly pressing it, to **Normal display**.

16.2.2 Selecting the type of assignment of the DNS server address (automatic / manual)

Access to this function is possible only if automatic IP address assignment has been selected (chap. 16.2.1).

Path: **Normal display** ▽ ▽ ▽ **Settings** OK ▽ **Ethernet** OK ▽ ▽ **DNS server**

Press the ***OK button*** to enable the setting.



Selection of the type of assignment of the DNS server address.

The current setting flashes. Use the ***arrow buttons*** to select between AUTO (automatic) and MANU (manual).

Confirm the setting with the ***OK button***.

If manual assignment of the DNS server address has been selected, you can now change with the ***arrow-down button*** to assign the DNS server address (chap. 16.2.6).

With the ***Back button*** you can go back to the "**Ethernet**" submenu and, repeatedly pressing it, to **Normal display**.

16.2.3 Assigning the IP address

Access to this function is possible only if manual IP address assignment has been selected (chap. 16.2.1)

Path: **Normal display** ▽ ▽ ▽ **Settings** OK ▽ **Ethernet** OK ▽ ▽ **IP address**

Press the ***OK button*** to enable the setting.

The IP address entry is done in four steps, corresponding to the number sections: (1).(2).(3).(4)

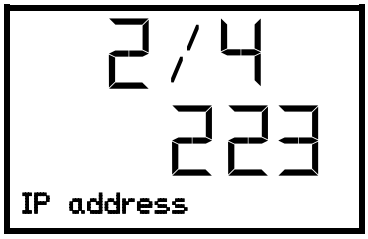
Principle of entry:

- Use the ***OK button*** to select the desired section of the IP address 1/4, 2/4, 3/4, 4/4 in the upper display line
- Use the ***Arrow buttons*** to enter the value for the selected section of the IP address

IP address assignment (sample values).

The first section of the IP address is shown. Enter the desired value with the ***arrow buttons***.

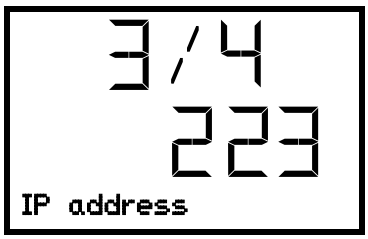
Use the ***OK button*** to confirm the entry and proceed to the second section of the IP address.



IP address assignment (sample values).

The second section of the IP address is shown. Enter the desired value with the ***arrow buttons***.

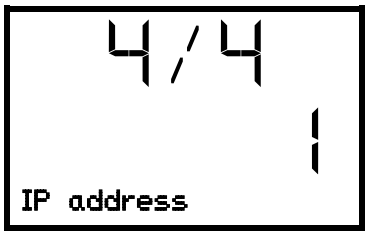
Use the ***OK button*** to confirm the entry and proceed to the third section of the IP address.



IP address assignment (sample values).

The third section of the IP address is shown. Enter the desired value with the ***arrow buttons***.

Use the ***OK button*** to confirm the entry and proceed to the last section of the IP address.



IP address assignment (sample values).

The forth section of the IP address is shown. Enter the desired value with the ***arrow buttons***.

Confirm the setting with the ***OK button***.

With the ***arrow-down button*** you can now change to the enter the subnet mask.

With the ***Back button*** you can go back to the "**Ethernet**" submenu and, repeatedly pressing it, to **Normal display**.

16.2.4 Setting the subnet mask

Access to this function is possible only if manual IP address assignment has been selected (chap. 16.2.1)

Path: **Normal display** ▽▽▽ **Settings** OK ▽ **Ethernet** OK ▽▽▽ **Subnet mask**

Press the ***OK button*** to enable the setting.

The subnet mask entry is done in four steps, corresponding to the number sections: (1).(2).(3).(4)

Principle of entry:

- Use the ***OK button*** to select the desired section of the subnet mask 1/4, 2/4, 3/4, 4/4 in the upper display line
- Use the ***Arrow buttons*** to enter the value for the selected section of the subnet mask

For details please refer to the description of the similar procedure in chap. 16.2.3 "Assigning the IP address".

With the ***arrow-down button*** you can now change to the enter the standard gateway.

With the ***Back button*** you can go back to the "**Ethernet**" submenu and, repeatedly pressing it, to **Normal display**.

16.2.5 Setting the standard gateway

Access to this function is possible only if manual IP address assignment has been selected (chap. 16.2.1)

Path: **Normal display** ▽▽▽ **Settings** OK ▽ **Ethernet** OK ▽▽▽ **Standard gateway**

Press the ***OK button*** to enable the setting.

The standard gateway entry is done in four steps, corresponding to the number sections: (1).(2).(3).(4)

Principle of entry:

- Use the ***OK button*** to select the desired section of the standard gateway 1/4, 2/4, 3/4, 4/4 in the upper display line
- Use the ***Arrow buttons*** to enter the value for the selected section of the standard gateway
- For details please refer to the description of the similar procedure in chap. 16.2.3 "Assigning the IP address".

With the ***arrow-down button*** you can now change to the assign the DNS server address.

With the ***Back button*** you can go back to the "**Ethernet**" submenu and, repeatedly pressing it, to **Normal display**.

16.2.6 Assigning the DNS server address

Access to this function is possible if manual IP address assignment (chap. 16.2.1) or manual DNS server address assignment (chap. 16.2.2) has been selected.

With manual IP address assignment:

Path: **Normal display** ▽ ▽ ▽ **Settings** OK ▽ **Ethernet** OK ▽ ▽ ▽ ▽ **DNS server address**

With manual DNS server address assignment:

Path: **Normal display** ▽ ▽ ▽ **Settings** OK ▽ **Ethernet** OK ▽ ▽ **DNS server address**

Press the ***OK button*** to enable the setting.

The DNS server address entry is done in four steps, corresponding to the number sections: (1).(2).(3).(4)

Principle of entry:

- Use the ***OK button*** to select the desired section of the DNS server address 1/4, 2/4, 3/4, 4/4 in the upper display line
- Use the ***Arrow buttons*** to enter the value for the selected section of the DNS server address
- For details please refer to the description of the similar procedure in chap. 16.2.3 “Assigning the IP address”.

With the ***Back button*** you can go back to the “**Ethernet**” submenu and, repeatedly pressing it, to **Normal display**.

17. Data recorder

An internal data recorder saves chamber data and events in three data sets.

With the export function “Export recorder data” (chap. 18.3) you can save the three data sets via the USB interface to USB stick. They are issued in the selected language as a spreadsheet with the file extension “.csv” and can be further processed in the desired program. The data is unencrypted. Always the entire data memory is read out.

17.1 Recorded data

All data is given out in tabular form. The headlines of the values “number”, “date”, and “time” are given out in the selected language, all other information in English.

- **Chamber data for the user “DL1”**

  Tabular representation of the actual temperature value and temperature set-point together with the date and time, according to the set storage rate (chap. 17.3). Temperature values are always given out in °C.

- **Chamber data for Avantor Services “DL2”**

  This data is intended for use by Avantor Services. The storage rate is fix (1 minute). Temperature values are always given out in °C.

- **Event list**

  Messages regarding the controller and data memory as well as the alarm messages together with the date and time:

  - Firmware update done
  - “New config (USB)”: New configuration uploaded via USB
  - “Data recorder cleared”: Data recorder and event list deleted via setup program

- Other event messages according to existing alarms
- The moment of switching the alarm state on and off is indicated under “On/Off”.

17.2 Storage capacity

The storage capacity of the data recorder depends on the number of entries.

- DL1 = 110.000 entries (equaling 76 days with a storage rate of 1 minute, setting see chap. 17.3)
- DL2 = 27.000 entries (equaling 18 days with a fix storage rate of 1 minute)
- Event list: 200 events

The shorter the set storage rate, the closer are the stored measuring points, the more precise, but also shorter is the documented period.

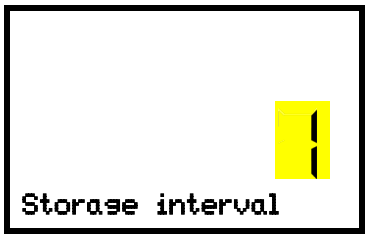
Once the storage capacity of the data recorder is reached, overwriting of the oldest values begins

17.3 Setting the storage rate for the “DL1” recorder data

Required access level: “Admin”.

Path: **Normal display** ▽ ▽ ▽ **Settings** OK ▽ ▽ **Data recorder** OK **Storage interval**

Press the ***OK button*** to enable the setting.



Function “Storage interval”.

The current setting flashes. Use the ***arrow buttons*** to enter the desired storage interval. Setting range: 1 minute to 60 minutes. Factory setting: 1 minute.

Press the ***OK button*** to confirm the setting.

With the ***Back button*** you can go back to the “**Data recorder**” submenu and, repeatedly pressing it, to **Normal display**.

17.4 Deleting the data recorder

When importing a configuration via USB stick (chap. 18.2) and when loading a new firmware version by Avantor Services, the entire data memory is deleted.

Avantor Services can also install the configuration by means of a setup program without deleting the data.

Regardless of this, Avantor Services can delete the data via a setup program.

Loading a new configuration via USB stick leads to deleting the data recorder.

	NOTICE
	Danger of information loss when loading a new configuration via USB stick. **Data loss.** ➢ Backup data before loading a new configuration via USB stick.

18. USB-Menu: Data transfer via USB interface

A USB interface for data transfer via USB stick is located in the controller housing.

The controller offers an import function and three export functions through the USB interface:

Import function (chap. 18.2):

- Configuration data in file “KONF380.set”

Export functions (chap. 18.3):

- Configuration data in file “KONF380.set”
- Recorder data
  - DL1 (chamber data for the user): “DL1_[MAC address of the chamber].csv”
  - DL2 (chamber data for Avantor Services): “DL2_[MAC address of the chamber].csv”
  - Event list: “EvList_[MAC address of the chamber].csv”

  For detailed information on the file content see chap. 17.1.
- Service data

  The "Service" folder is created on the USB stick and can be sent Avantor Services. In addition to the configuration and recorder data, it contains further service-relevant information.

18.1 Connecting the USB stick

Connect the USB stick to the interface located in the controller housing.

	Connect only USB sticks to the USB interface. The USB stick must be formatted with FAT32 and have at least 8GB of memory.

After inserting the USB stick, the initial function “Import configuration” is displayed.

As long as the USB stick is connected, only the functions for data transfer are available. Other controller functions are only available after removing the USB stick.

18.2 Import function

Required access level: “Admin”.

Function “Import configuration”.
To import configuration data from the USB stick, press the ***OK button***.

With the ***arrow-down button*** you can now change to the setting of the “Export configuration” function.

18.3 Export functions

Required access level: any user

Function “Export configuration”.

To write the configuration data from the controller to the USB stick, press the ***OK button***.

With the ***arrow-down button*** you can now change to the next function.

Function “Export recorder data”.

To write the recorder data from the controller to the USB stick, press the ***OK button***.

With the ***arrow-down button*** you can now change to the next function.

Function “Export service data”.

To write the chamber data from the controller to the USB stick, press the ***OK button***.

18.4 Ongoing data transfer

A moving arrow symbol indicates the progress of the data transfer.

Example:

Data recording is running.

Attention! Danger of data loss! Do not disconnect the USB stick from the device during ongoing data transfer!

After successful transfer, the controller shows again the initial function “Import configuration”.

18.5 Error during data transmission

In the event of an error, the message ERR (error) is displayed.

Read error (example).

18.6 Removing the USB stick

Logging off the USB stick is not possible / required.

Be sure that no data recording is running (chap. 18.4).

After removing the USB stick, the controller is back in the same menu as before when connecting the USB stick.

19. Setting and activating the service setpoint

To set a lower setpoint value for test purposes or for adjustment, you can enter and activate a service setpoint. This setting is outside the control range and is not intended for normal operation.

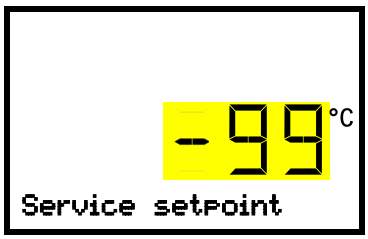
Once the service setpoint has been activated, the standard temperature setpoint will have no effect. Only after deactivating the service setpoint, the chamber will equilibrate again to the standard temperature setpoint.

19.1 Setting the service setpoint

Required access level: “Admin”.

Path: **Normal display** ▽ ▽ ▽ **Settings** OK ▽ ▽ ▽ **Various** OK ▽ ▽ ▽ **Service setpoint**

Press the ***OK button*** to enable the setting.



Setting the service setpoint

The current setting flashes. Use the ***arrow buttons*** to enter the desired value. Entry range: +20 °C up to -99 °C. Factory setting: -99 °C.

Confirm the setting with the ***OK button***.

With the ***arrow-up button*** you can go to the tolerance range alarm setting (chap. 14.3).

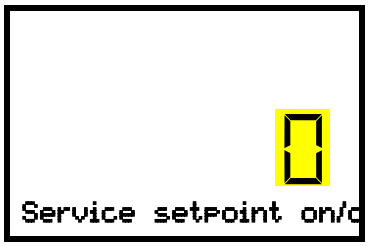
With the ***Back button*** you can go back to the “**Various**” submenu and, repeatedly pressing it, to **Normal display**.

19.2 Activating the service setpoint

Required access level: “User”.

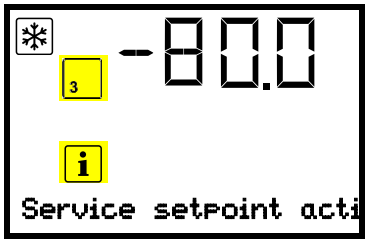
Path: **Normal display** ▽ **Setpoints** OK ▽ **Functions on/off** OK ▽ ▽ **Service setpoint on/off**

Press the ***OK button*** to enable the setting.



Setting function 3 “Service setpoint on/off”.
The current setting flashes. Use the ***arrow buttons*** to select between 1 (Service setpoint active) and 0 (Service setpoint not active).
Confirm the setting with the ***OK button***.

With the ***Back button*** you can go back to the “**Functions on/off**” submenu and, repeatedly pressing it, to **Normal display**.



Normal display with the information message “Service setpoint active”.

The service setpoint will remain active until manually deactivating function 3 “Service setpoint on/off”.

20. Data monitoring and recording

20.1 Ethernet interface

The chamber is regularly equipped with an Ethernet interface in the rear connection panel (M). The MAC Address is indicated in the “Ethernet” controller menu (chap. 16.1.1).

21. Chamber inventory: Storage rack systems and cryo boxes (option)

21.1 Storage rack systems with or without cryo boxes

For optimum use of the available space of the freezer compartments, the following racks are available:

- Side access racks, stainless steel
- Sliding drawer racks, stainless steel

Please visit www.vwr.com for more details.

21.2 Cryo boxes

Please visit www.vwr.com for more details.

22. Cleaning and decontamination

Clean the chamber after each use to avoid potential corrosion damage by ingredients of the charging material.

Prior to renewed startup, allow the chamber to completely dry after all cleaning and decontamination measures.

During operation: Wipe only the outer surfaces with a humid cloth and then dry it thoroughly

DANGER

Electrical hazard by water entering the chamber.

Deadly electric shock.

- ∅ Do NOT spill water or cleaning agents over the inner and outer chamber surfaces.
- ∅ Do NOT put ANY cleaning aids (cloth or brush) into slots or openings on the chamber.
- ➢ Before cleaning, turn off the chamber at the main power switch and disconnect the power plug.
- ➢ Completely dry the chamber before turning it on again.

22.1 Cleaning

Disconnect the chamber from the power supply before cleaning. Disconnect the power plug.

	The interior of the chamber must be kept clean. Thoroughly remove any residues of the charging material.

Wipe the surfaces with a moistened towel. In addition, you can use the following cleaning agents (apply on a cloth):

Exterior surfaces, door handle, controller housing with controller panel, interior (stainless steel), shelves, door gaskets	Standard commercial cleaning detergents free from acid or halides. Alcohol based solutions. We recommend using a neutral cleaning agent.
Connection panel on the chamber rear	Standard commercial cleaning detergents free from acid or halides. We recommend using a neutral cleaning agent.
Zinc coated hinge parts rear chamber wall	Standard commercial cleaning detergents free from acid or halides. Do NOT use a neutral cleaning agent on zinc coated surfaces.

Do not use cleaning agents that may cause a hazard due to reaction with components of the device or the charging material. If there is doubt regarding the suitability of cleaning products, please contact Avantor Services.

	We recommend using a neutral cleaning agent for a thorough cleaning. Any corrosive damage that may arise following use of other cleaning agents is excluded from liability by VWR. Any corrosive damage caused by a lack of cleaning, is excluded from liability by VWR.

NOTICE

Danger of corrosion by using unsuitable cleaners.

Damage to the chamber.

∅ Do NOT use acidic or chlorine cleaning detergents.

∅ Do NOT use a neutral cleaning agent on other kind of surfaces e.g., the zinc coated hinge parts or the rear chamber wall.

For surface protection, perform cleaning as quickly as possible.

After cleaning completely remove cleaning agents from the surfaces with a moistened towel. Let the chamber dry.

Soapsuds may contain chlorides and must therefore NOT be used for cleaning.

DANGER

Risk of locking in a person.

Death from suffocation or freezing.

➢ Before closing doors, make sure that nobody is inside.

➢ Pull the power plug before entering the interior (e.g. for cleaning purposes).

With every cleaning method, always use adequate personal safety controls.

Following cleaning, leave the chamber door open or remove the access port plugs.

Neutral cleaning agents may cause health problems in contact with skin and if ingested. Follow the operating instructions and safety hints labeled on the bottle of the neutral cleaning agent.

Recommended precautions: To protect the eyes use sealed protective goggles. Wear gloves. Suitable protective gloves in full contact with media: butyl or nitrile rubber, penetration time >480 minutes.

CAUTION

Danger of chemical burns through contact with skin or ingestion of the neutral cleaning agent.

Skin and eye damage. Environmental damage.

∅ Do not ingest a neutral cleaning agent. Keep it away from food and beverages.

∅ Do NOT empty the neutral cleaning agent into drains.

➢ Wear protective gloves and goggles.

➢ Avoid skin contact with the neutral cleaning agent.

The door handle, door hinges and the locking counterpart must be cleaned at least once a year

22.2 Decontamination / chemical disinfection

The operator must ensure that proper decontamination is performed in case a contamination of the chamber by hazardous substances has occurred.

Disconnect the chamber from the power supply prior to chemical decontamination. Disconnect the power plug.

Do not use decontamination agents that may cause a hazard due to reaction with components of the device or the charging material. If there is doubt regarding the suitability of cleaning products, please contact Avantor Services.

You can use the following disinfectants:

	For chemical disinfection, we recommend using a disinfectant spray. Any corrosive damage that may arise following use of unsuitable disinfectants is excluded from liability by VWR.

	With every decontamination method, always use adequate personal safety controls.

	In case of eye contact, the disinfectant spray may cause eye damage due to chemical burns. Follow the operating instructions and safety hints labeled on the bottle of the disinfectant spray.

Recommended precautions: To protect the eyes use sealed protective goggles.

	**CAUTION** **Danger of chemical burns through eye contact with the disinfectant spray.** **Eye damage. Environmental damage.** ∅ Do NOT empty the disinfectant spray into drains. ➢ Wear protective goggles.

	After using the disinfectant spray, allow the chamber to dry thoroughly, and aerate it sufficiently.

Alternatively, you can use the following disinfectants (apply on a cloth):

Interior (stainless steel)	Standard commercial surface disinfectants free from acid or halides (not dripping). Alcohol based solutions.
Compartment doors	Standard commercial surface disinfectants free from acid or halides (not dripping). Alcohol based solutions max. 10%
Outer door gasket (PVC) and inner door gasket (silicon)	Alcohol based solutions

	Following use, completely remove any disinfectant with a sterile moistened towel from the surfaces.

Before start-up, the chamber must be absolutely dry and ventilated, as explosive gases may form during the decontamination process.

23. Maintenance and service, service, troubleshooting, repair, testing

23.1 General information, personnel qualification

- **Maintenance**

  See chap. 23.2.

- **Maintenance work by the user**

  This work must be carried out regularly by the operating personnel to maintain the chamber function (chap. 23.2).

  For personnel requirements please refer to chap. 2.1.

- **Simple troubleshooting**

  Chap. 23.4 describes troubleshooting by operating personnel. It does not require technical intervention into the chamber, nor disassembly of chamber parts.

  For personnel requirements please refer to chap. 2.1.

- **Detailed troubleshooting**

  If errors cannot be identified with simple troubleshooting, further troubleshooting must be performed by Avantor Services or by service partners or technicians qualified by Avantor.

  For service requirements please contact Avantor Services.

- **Repair**

  Repair of the chamber can be performed by Avantor Services or by service partners or technicians qualified by Avantor.

  After maintenance, the chamber must be tested prior to resuming operation.

- **Electrical testing**

  To prevent the risk of electrical shock from the electrical equipment of the chamber, an annual repeat inspection as well as a test prior to initial startup and prior to resuming operation after maintenance or repair, are required. This test must meet the requirements of the competent public authorities. We recommend testing under EN 50678:2020 / EN 50699:2020.

  For service requirements please contact Avantor Services.

23.2 Maintenance intervals, service

Web Resources

Visit the VWR website at **www.vwr.com** for:

- Complete Equipment Service contact information
- Access to the VWR Online Catalogue, and information about accessories and related products
- Additional product information and special offers

Contact us

For information or technical assistance contact your local VWR representative or visit www.vwr.com.

DANGER

Electrical hazard during live maintenance work.

Deadly electric shock.

- ∅ The chamber must NOT become wet during operation or maintenance works.
- ∅ Do NOT remove the rear panel of the chamber and the maintenance flaps on the chamber sides.
- ➢ Before conducting maintenance work, turn off the chamber at the main power switch and disconnect the power plug.
- ➢ General maintenance work must be conducted by licensed electricians or experts authorized by VWR.
- ➢ Maintenance work at the refrigeration system must only be conducted by qualified personnel who underwent training in accordance with EN 13313:2010 (e.g. a refrigeration technician with certified expert knowledge acc. to regulation 303/2008/EC). Follow the national statutory regulations.

Ensure regular maintenance work is performed at least once a year and that the legal requirements are met regarding the qualifications of service personnel, scope of testing and documentation. All work on the refrigeration system (repairs, inspections) must be documented.

The warranty becomes void if maintenance work is conducted by non-authorized personnel.

With an increased amount of dust in the ambient air, clean the condenser fan (by suction or blowing) several times a year. Check the condenser air filter frequently and clean / replace it if necessary (chap. 23.3.1).

We recommend taking out a maintenance agreement. Please consult Avantor Services.

23.3 Maintenance work by the user

23.3.1 Checking and cleaning / replacing the condenser air filter

The condenser air filter prevents accumulation of dust on the condenser. If the filter is blocked by dust this may cause decrease or failure of refrigeration.

Check the air filter visually for soiling every month. Especially with the alarm message “Condenser temp.” (chap. 15.1) the filter may be soiled. You can rinse the filter and use it again.

Regularly check the filter visually for soiling.

The filter is located behind the air filter flap (E) in the lower housing cover. You can easily take it out for cleaning or replacement.

- Unscrew the quick locking screws (E2) of the air filter flap (E) and remove the air filter flap
- Remove the condenser air filter (E1).
- Wash the condenser air filter with water and let it dry. If necessary, replace the filter.
- Insert the condenser air filter and mount the air filter flap. Mount the quick locking screws.

Replacement condenser air filter	EU Cat. no.	NA Part no.
	471-1261	76521-268

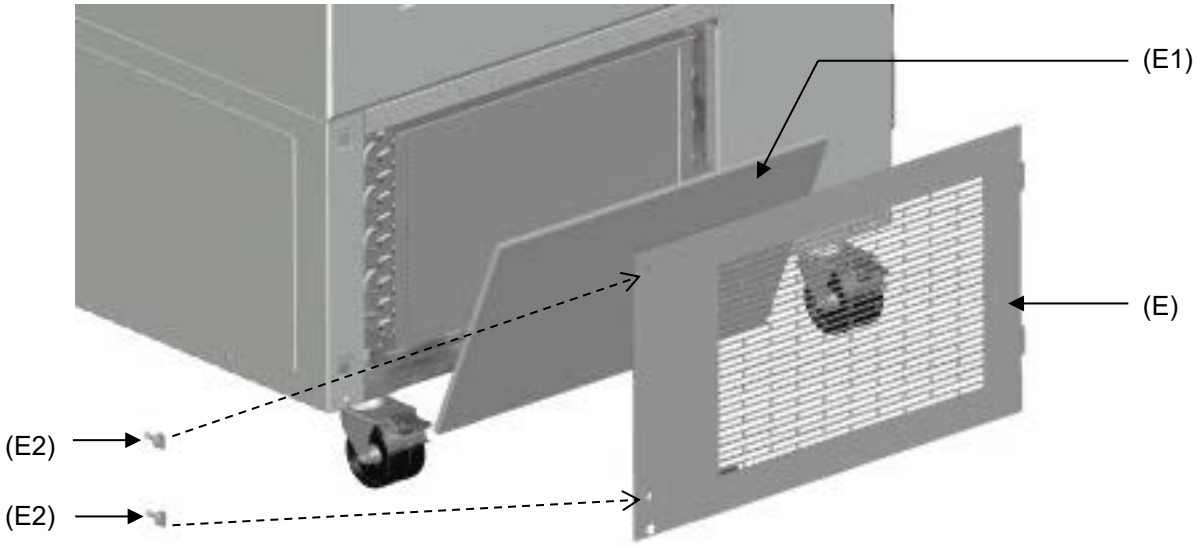


Figure 21: Removing the condenser air filter

(E) Air filter flap

(E1) Condenser air filter

(E2) Quick locking screws

	Fix the condenser air filter and the air filter flap correctly following cleaning or replacement.

23.3.2 Cleaning the condenser

Every 6 months remove by suction any visible dust on the condenser lamellas with a vacuum cleaner. If appropriate, blow through the lamellas with compressed air.

With an increased amount of dust in the ambient air, clean the condenser several times a year. In this case we recommend to weekly check the condenser lamellas (behind the air filter flap (E). If soiling is visible, turn off the chamber and remove the dust by suction from the condenser lamellas.

23.3.3 De-icing and defrosting

	We recommend for material that could be damaged already by slight warming, to provide adequate storage facilities (e.g., in a second chamber / with liquid nitrogen).

Ice may form in the upper area of the freezer and on the interior doors. Excessive frost may lead to increasing the inner chamber temperature. Remove the frost on the doors with the ice scraper (part of the optionally available deicing kit).

	Regularly (recommendation: every month) remove the frost on the doors with the ice scraper.

Note: If the door has not been opened for a longer period of time (more than 5 days), it is advisable to de-ice the door gaskets and the inner opening of the pressure compensation valve (I). After that, the door can be opened even after a short period of time without applying great force.

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

To defrost the entire chamber, proceed as follows:

- Turn off external protocol systems if applicable.
- Place the stored material in another freezer or in a container refrigerated by dry ice or liquid carbon dioxide.
- Turn off the chamber at its main power switch (J) and disconnect it from the power supply.
- Open the outer door and all inner doors.
- Place absorbent towels on the bottom of the inner chamber or mount the optional drain well (chap. 3.5) and allow the frost to melt.

	**NOTICE** **Risk of damage to the interior through scraping and piercing with a sharp instrument.** **Damage to the chamber.** ∅ NEVER use tools with a sharp edge to remove the frost. ➢ Use the supplied ice scraper only.

- Wipe up the accumulated water with absorbent towels
- Let the interior of the freezer dry. Clean and decontaminate it as described in chap. 22

	When taking the chamber into operation again, please follow the hints given in chap. 7.2.

- Connect the freezer to the power supply and turn it on with the main power switch (J).
- Operate the chamber for at least 9 hours. Then introduce the material into the freezer.
- Turn on external protocol systems if applicable.

When defrosting, water may accumulate on the shelves and the bottom. Procedure to remove it:

- Carry the water from the freezer shelves and bottom with the wiper into the drain well (option, chap. 3.5).
- Then dry all inner chamber equipment with an absorbent towel.

23.3.4 Maintenance of the door lock

The door handle, door hinges and the locking counterpart must be cleaned at least once a year (chap. 22.1). After cleaning, lubricate the running surface of the handle and the locking counterpart with medical vaseline.

23.4 Simple troubleshooting

Defects and shortcomings can compromise the operational safety of the chamber and can lead to risks and damage to equipment and persons. If there is a technical fault or shortcoming, take the chamber out of operation and inform Avantor Services. If you are not sure whether there is a technical fault, proceed according to the following list. If you cannot clearly identify an error or there is a technical fault, please contact Avantor Services.

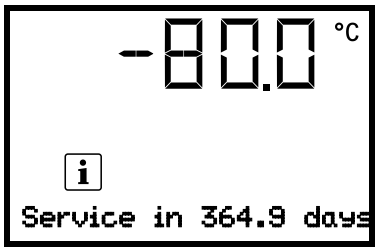
	Only qualified service personnel authorized by VWR must perform repair. Repaired chambers must comply with the VWR quality standards.

Fault description	Possible cause	Required measures
General		
Chamber without function.	No power supply.	Check connection to power supply.
	Wrong voltage.	Check power supply for correct voltage (chap.5.4).
	Chamber fuse has responded.	Check chamber fuse and replace it if appropriate. If it responds again, contact Avantor Services.
	Controller defective.	Contact Avantor Services.
Alarm message “Door open”	Chamber door open.	Close chamber door.
Refrigerating performance		
No refrigerating performance after turning on the chamber. Alarm message “Safety controller”	Limit temperature reached.	Check setting of temperature set-point and of safety controller. If appropriate, select suitable limit value.
	Controller defective.	Contact Avantor Services.
	Safety controller defective.	
	Semi-conductor relay defective.	
	Too much external heat load.	Reduce heat load
Chamber refrigerating permanently, set-point not held.	Semiconductor relay defective.	Contact Avantor Services.
	Controller defective.	
	Controller not adjusted, or adjustment interval exceeded.	Calibrate and adjust controller.
	Door not shut tightly.	Check if doors are closed.
	Frost on door gasket.	Defrost the door gasket with the ice scraper.
	Door gasket defective.	Contact Avantor Services.
	Door opened very frequently.	Open doors less frequently
	Place of installation too warm.	Select cooler place of installation or contact Avantor Services.
	Introduction of too warm or too large amount of material.	Cool down material before introducing and / or load in smaller portions.
Alarm message “Temp. range”	Current actual temperature value outside the tolerance range.	Operation temporarily possible. Check the tolerance range settings. With other error messages remove the respective cause.
Alarm message “Inner temp. sensor”	Inner temperature sensor defective. Control continues using the safety controller temperature sensor	Operation temporarily possible. Contact Avantor Services.
Alarm message “Safety control sensor”	Safety controller temperature sensor defective	Operation temporarily possible. Contact Avantor Services.
Temperature display shows “- - - - ” or “<-<-<” or “>->->” Messages alternating: Inner temp. sensor and Safety control sensor	Inner temperature sensor and safety controller temperature sensor defective. Refrigeration is turned on permanently.	Contact Avantor Services.

Fault description	Possible cause	Required measures
Refrigerating performance (continued)		
Alarm message “Cascade temp. sensor”	Failure of Pt100 temperature sensor. Refrigerating machine in continuous operation (see chap. 15.4.5).	Contact Avantor Services.
Alarm message “Condensate temp. sensor” or “Ambient temp. sensor”	Failure of Pt100 temperature sensor.	Contact Avantor Services.
No or too low refrigerating performance.	Pt 100 sensor defective.	Contact Avantor Services.
	Refrigerating system defective.	
	Semiconductor relay defective.	
	Temperature set-point not set correctly on the controller.	Set temperature set-point correctly.
	Ambient temperature too high > 32 °C (chap. 4.5).	Select cooler place of installation.
	Compressor not switched on.	Contact Avantor Services.
	No or not enough refrigerant.	
	Too much external heat load.	Reduce heat load.
Alarm message “Continuous operation”	Cooling system error.	Contact Avantor Services.
	Semiconductor relay defective.	
	Controller defective.	
Alarm message “Compressor defective”	Cooling system error.	Turn off the chamber and contact Avantor Services.
	Condenser fan defective.	
Alarm message “Condenser temp.”	Condenser air filter soiled.	Clean / replace the condenser air filter (chap. 23.3.1).
	Condenser soiled.	Clean the condenser (chap. 23.3.2).
	Ventilation slots are blocked.	Make sure to have free air access to the device at the front and bottom.
	Place of installation too hot.	Select cooler place of installation or contact Avantor Services.
	Chamber positioned too close to the wall (spacers not mounted or twisted).	Install / check the spacers (chap. 5.2).
Humidity		
Icing at the walls of the inner chamber	Long time of continuous operation.	Defrost the chamber (chap. 23.3.3)
Controller		
No chamber function (dark display).	Power failure.	Reinstall power supply.
	Main power switch (J) is off.	Turn on the main power switch (J).
Menu functions not available.	Menu functions not available with current authorization level.	Log in with the required higher authorization.
No access to controller	Password incorrect.	Contact Avantor Services.
Acknowledging the alarm does not cancel the alarm state.	Cause of alarm persists.	Remove cause of alarm. If the alarm state continues, contact Avantor Services.

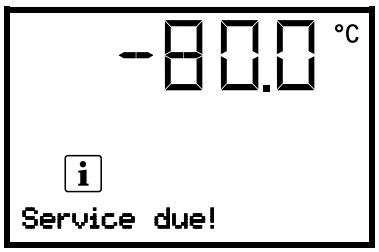
23.5 Service Reminder

You can display the time until the service due in the controller. Keep the ***OK button*** pressed down for 5 seconds.



The remaining time in days until maintenance is due is shown in the text field of the controller display.
Press the ***OK button*** to confirm the message.

After the recommended maintenance interval (one year of operation) a message appears on the controller.



The message “Service due!” is shown in the text field of the controller display.
Press the ***OK button*** to confirm the message.

After one week of operation, the message reappears.

24. Decommissioning

- Turn off the chamber with the main power switch (J) and disconnect it from the power supply (pull the power plug).
- Let the chamber defrost (chap. 23.3.3).
- Temporal decommissioning: See indications for appropriate storage, chap. 4.4.
- Final decommissioning: Dispose of the chamber as described in chap. 25.2.

When restarting the chamber, please pay attention to the corresponding information in chap. 7.2.

25. Disposal

25.1 Disposal of the transport packing

Packing element	Material	Disposal
Straps to fix packing on pallet	Plastic	Plastic recycling
Wooden transport box (option)	Non-wood (compressed match-wood, IPPC standard)	Wood recycling
with metal screws	Metal	Metal recycling
Unloading ramps	Metal	Metal recycling
Pallet with foamed plastic stuffing	Solid wood (IPPC standard)	Wood recycling
	PE foam	Plastic recycling
Transport box with metal clamps	Cardboard	Paper recycling
	Metal	Metal recycling
Top cover with foamed plastic stuffing	Cardboard	Paper recycling
	PE foam	Plastic recycling
Bag for operating manual	PE foil	Plastic recycling
Insulating air cushion foil (packing of optional accessories)	PE foil	Plastic recycling

If recycling is not possible, all packing parts can also be disposed of with normal waste.

25.2 Equipment disposal

This equipment is marked with the crossed out wheeled bin symbol to indicate that this equipment must not be disposed of with unsorted waste.

Instead it's your responsibility to correctly dispose of your equipment at lifecycle - end by handling it over to an authorized facility for separate collection and recycling. It's also your responsibility to decontaminate the equipment in case of biological, chemical and/or radiological contamination, so as to protect from health hazards the persons involved in the disposal and recycling of the equipment.

For more information about where you can drop off your waste of equipment, please contact your local dealer from whom you originally purchased this equipment.

By doing so, you will help to conserve natural and environmental resources and you will ensure that your equipment is recycled in a manner that protects human health. Thank you.

	The refrigerants used R290 (propane, GWP 3) and R170 (ethane, GWP 6) are inflammable at ambient pressure. A suction is not required. Ensure the compliance with the applicable legal requirements regarding qualification of staff, and documentation

26. Technical description

26.1 Factory calibration and adjustment

The chambers were calibrated and adjusted in factory. Calibration and adjustment were performed using standardized test instructions, according to the QM DIN EN ISO 9001 system applied by the manufacturer. All test equipment used is subject to the administration of measurement and test equipment that is also a constituent part of the manufacturer's QM DIN EN ISO 9001 system. They are controlled and calibrated to a DKD-Standard at regular intervals.

	Repeated calibrations are recommended in periods of 12 months. Please contact Avantor Services for details.

26.2 Over current protection

The devices are equipped with an internal fuse not accessible from outside. If this fuse is blown, please inform an electronic engineer or Avantor Services.

26.3 Technical data

Chamber size (referring to the max. quantity of 2" boxes)		**352**	**528**
Exterior dimensions			
Width, gross (including hinges, door handle, and controller housing)	mm / *inch*	920 / *36.2*	1204 / *47.4*
Height, gross (incl. castors)	mm / *inch*	1966 / *77.4*	1966 / *77.4*
Depth, gross (including power connection, without door handle and controller housing (equals depth when door open))	mm / *inch*	850 / *33.5*	850 / *33.5*
Depth, gross (including power connection, door handle and controller housing)	mm / *inch*	1005 / *39.6*	1005 / *39.6*
Wall clearance rear (minimum)	mm / *inch*	100 / *3.9*	100 / *3.9*
Wall clearance side (side without hinges) (minimum)	mm / *inch*	100 / *3.9*	100 / *3.9*
Wall clearance side (side with hinges) (minimum)	mm / *inch*	245 / *9.6*	245 / *9.6*

Chamber size (referring to the max. quantity of 2” boxes)		**352**	**528**
Doors			
Number of chamber doors		1	1
Number of compartment doors		2	2
Interior dimensions			
Quantity of compartments with 3 shelves (standard)		4	4
Width of inner chamber	mm / *inch*	606 / *23.9*	890 / *35.0*
Height of interior	mm / *inch*	1300 / *51.2*	1300 / *51.2*
Height of individual compartment (with shelves)	mm / *inch*	312-319 *12.3-12.6*	312-319 *12.3-12.6*
Depth of inner chamber	mm / *inch*	604 / *23.8*	604 / *23.8*
Interior volume, total	l	491 / *17.3*	728 / *25.7*
Shelves			
Quantity of shelves (regular)		3	3
Quantity of shelves (max.)		13	13
Width of shelf	mm / *inch*	580 / *22.8*	860 / *33.9*
Depth of shelf	mm / *inch*	590 / *23.2*	590 / *23.2*
Permitted max. load per shelf (regular shelf)	kg / *lbs*	50 / *110*	50 / *110*
Permitted max. load of inner chamber bottom	kg / *lbs*	50 / *110*	50 / *110*
Permitted total load	kg / *lbs*	200 / *441*	200 / *441*
Quantity of stainless-steel racks per level		4	6
Max. quantity of cryo boxes 50 mm / *2 inch*		352	528
Max. quantity of cryo boxes 75 mm / *3 inch*		224	336
Temperature data			
Setting and control range	°C *°F*	-86 up to -50 *-123 up to -58*	-86 up to -50 *-123 up to -58*
Temperature uniformity (variation) at -80 °C / *-112 °F*	± K	2.5	2.5
Temperature fluctuation at -80 °C / *-112 °F*	± K	1.5	1.5
Pull-down time from +25 °C / *71.6 °F* to -80 °C / *-112 °F*	minutes	360	420
Pull-up time in case of power failure from -80 °C / *-112 °F* to -50 °C / *-58 °F*	minutes	360	360
Weight			
Weight of the chamber (empty)	kg / *lbs*	247 / *545*	288 / *635*
Electrical Data VWR® ULT Freezer (230 V)			
IP system of protection acc. to EN 60529	IP	20	20
Nominal voltage (±10%) at 50 Hz power frequency	V	230	230
Current type		1N~	1N~
Nominal power	kW	1.6	1.6
Nominal current	A	7.0	7.0
IEC connector plug and cable	mm / *inch*	2000 / *78.7*	2000 / *78.7*
Power plug		Grounded plug EU, UK, CH	
Installation category acc. to IEC 61010-1		II	II
Pollution degree acc. to IEC 61010-1		2	2
Internal over-current release category C, 2 poles	A	10	10

Chamber size (referring to the max. quantity of 2” boxes)		**352**	**528**
Electrical Data VWR® ULT Freezer, UL model (120 V)			
IP system of protection acc. to EN 60529	IP	20	20
Nominal voltage (+/- 10%) at 60 Hz power frequency	V	115	115
Current type		1N~	1N~
Nominal power	kW	1.4	1.4
Nominal current	A	11.7	11.7
IEC connector plug and cable	mm / *inch*	2000 / *78.7*	2000 / *78.7*
Power plug	NEMA	5-15 P	5-15 P
Installation category acc. to IEC 61010-1		II	II
Pollution degree acc. to IEC 61010-1		2	2
Internal over-current release category C, 2 poles	A	13	13
Electrical Data VWR® ULT Freezer, UL model (208-230 V)			
IP system of protection acc. to EN 60529	IP	20	20
Nominal voltage (+/- 10%) at 60 Hz power frequency	V	208-230	208-230
Current type		2~	2~
Nominal power	kW	1.6	1.6
Nominal current	A	7.7	7.7
IEC connector plug and cable	mm / *inch*	2000 / *78.7*	2000 / *78.7*
Power plug	NEMA	6-15P	6-15P
Installation category acc. to IEC 61010-1		II	II
Pollution degree acc. to IEC 61010-1		2	2
Internal over-current release category C, 2 poles	A	10	10
Environment-specific data VWR® ULT Freezer (230 V)			
Noise level (mean value)	dB (A)	47	47
Energy consumption at -80 °C/ *-112 °F*, with an ambient temperature of +25 °C / *77°F;* +/- 10%	kWh/day	7.9	8.1
Heat dissipation at set-point -80 °C / *-112 °F*	Wh/h	330	340
Filling weight of refrigerant R290 (propane) (1st stage cooling, GWP 3)	kg	0.15	0.15
Filling weight of refrigerant R170 (ethane) (2nd stage cooling, GWP 6)	kg	0.15	0.15
Environment-specific data VWR® ULT Freezer, UL model (120 V)			
Noise level (mean value)	dB (A)	47	47
Energy consumption at -80 °C/ *-112 °F*, with an ambient temperature of +25 °C / *77°F;* +/- 10%	kWh/day	7.9	8.1
Filling weight of refrigerant R290 (propane) (1st stage cooling, GWP 3)	kg	0.15	0.15
Filling weight of refrigerant R170 (ethane) (2nd stage cooling, GWP 6)	kg	0.15	0.15
Environment-specific data VWR® ULT Freezer, UL model (208-230 V)			
Noise level (mean value)	dB (A)	47	47
Energy consumption at -80 °C/ *-112 °F*, with an ambient temperature of +25 °C / *77°F;* +/- 10%	kWh/day	7.9	8.1
Filling weight of refrigerant R290 (propane) (1st stage cooling, GWP 3)	kg	0.15	0.15
Filling weight of refrigerant R170 (ethane) (2nd stage cooling, GWP 6)	kg	0.15	0.15

All technical data is specified for chambers with unloaded standard equipment at an ambient temperature of +22 °C +/- 3°C / *71.6 °F +/- 5.4 °F* and a power supply voltage fluctuation of +/-10. Technical data is determined in accordance to the manufacturer’s factory standard and DIN 12880:2007.

All indications are average values, typical for chambers produced in series. We reserve the right to change technical specifications at any time.

26.4 Equipment and options (extract)

	To operate the chamber, use only original VWR accessories or accessories / components from third-party suppliers authorized by VWR. The user is responsible for any risk arising from using unauthorized accessories.

Regular equipment
Microprocessor controller for temperature
Electronic error auto-diagnosis system with zero-voltage relay alarm output
Ethernet interface for computer communication
USB interface
Safety controller
V technology (vacuum insulation panels)
Powerful, energy-efficient refrigeration system

Regular equipment
4 compartments, 2 compartment doors
3 shelves
Two available 28 mm access ports
Voltage 230 V
Voltage 120 V
Voltage 208-230 V
Door lock

Options / accessories
Stainless steel shelf set, 1 shelf with shelf holders
Deicing kit, consisting of drain well for condensate, wiper, adhesive tape scratch, ice scraper
Lockable main switch
Chamber inventory: side access racks, sliding drawer racks, cryo boxes
Qualification documentation

26.5 User replaceable accessories and spare parts

	VWR is responsible for the safety features of the chamber only provided skilled electricians or qualified personnel authorized by VWR perform all maintenance and repair, and if components relating to chamber safety are replaced in the event of failure with original spare parts. The user is responsible for any risks arising from using unauthorized accessories / components.

Chamber size (referring to the max. quantity of 2” boxes)	**352**		**528**	
Description	**EU Cat. no.**	**NA Part no.**	**EU Cat. no.**	**NA Part no.**
Compartment door, insulated	471-1254	76509-446	471-1255	76509-448
Stainless steel shelf set, 1 shelf with shelf holders	471-1259	76509-456	471-1260	76509-458

Chamber size (referring to the max. quantity of 2” boxes)	**352**		**528**	
Description	**EU Cat. no.**	**NA Part no.**	**EU Cat. no.**	**NA Part no.**
Deicing kit (complete set), consisting of • Drain well for condensate, with gasket • Wiper (rubber to wipe off water) • Adhesive tape scratch • Ice scraper	471-1257	76509-452	471-1258	76509-454

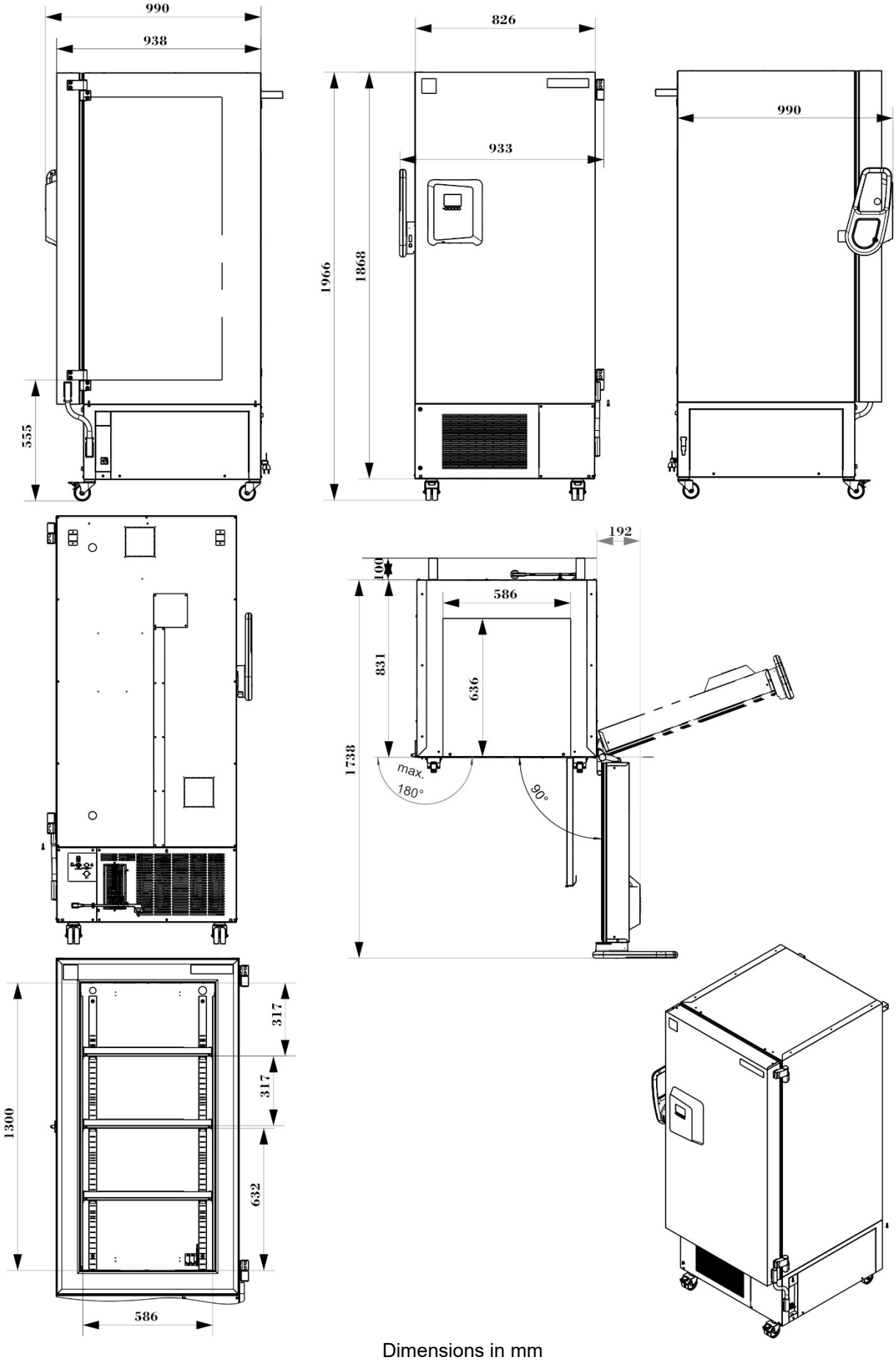
Description	**EU Cat. no.**	**NA Part no.**
Lockable main switch (protective flap for main power switch)	471-1256	76509-450
Replacement condenser air filter / filter mat	471-1261	76521-268

For information on components not listed here, please contact Avantor Services.

For details on racks and boxes please visit www.vwr.com.

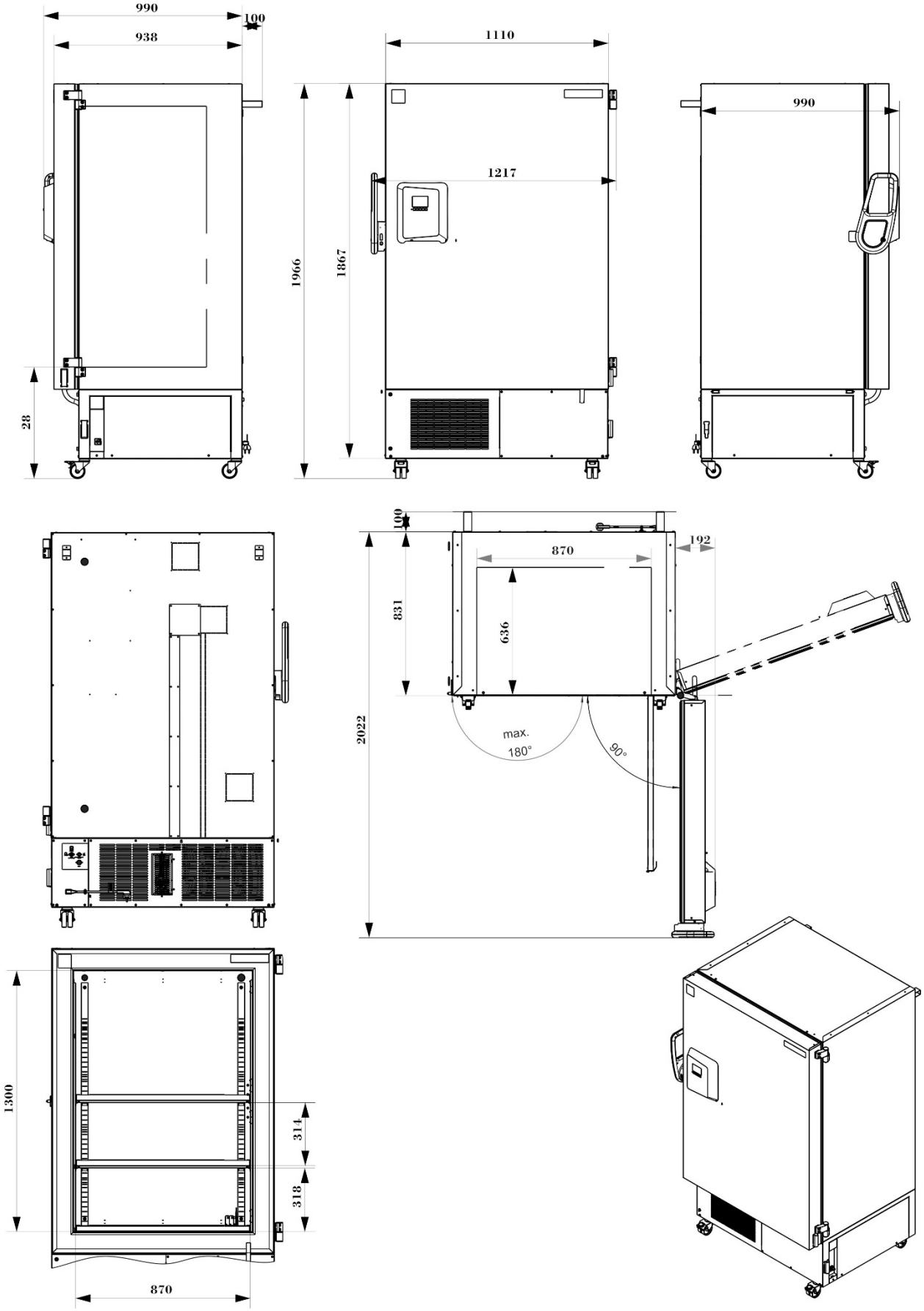
For qualification documents please contact Avantor Services.

26.6 Dimensions of VWR® ULT Freezer 352 Eco Premium



Dimensions in mm

26.7 Dimensions of VWR® ULT Freezer 528 Eco Premium



Dimensions in mm

27. Certificates and declarations of conformity

EU Declaration of Conformity and UK Declaration of Conformity can be downloaded at https://www.vwr.com/

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