BINDER
Best conditions for your success

Operating Manual

Translation of the original operating manual

CB / CB-UL, CBF / CBF-UL (E7, E7.1)

CO_2 Incubators

CO_2 Incubators with O_2 Control

CO_2 Incubators with Humidity control

with sterilizable NDIR sensor system for CO_2
and microprocessor display program controller MB2 with touchscreen

Model	Model version	Voltage	Equipment	Art. no.
CB 56	CB56-230V	200-230 V		9640-0005
CB 56-UL	CB56-120V	100-120 V		9640-0007
CB 170	CB170-230V	200-230 V		9640-0009
CB 170	CB170-230V-D	200-230 V	Access port 30 mm, left	9640-0027
CB 170	CB170-230V-O	200-230 V	O_2 control 0-20 vol.-%	9640-0010
CB 170-UL	CB170-120V	100-120 V		9640-0011
CB 170-UL	CB170UL-120V-D	100-120 V	Access port 30 mm, left	9640-0028
CB 170-UL	CB170-120V-O	100-120 V	O_2 control 0-20 vol.-%	9640-0012
CB 260	CB260-230V	200-230 V		9640-0013
CB 260	CB260-230V-O	200-230 V	O_2 control 0-20 vol.-%	9640-0014
CB 260-UL	CB260-120V	100-120 V		9640-0015
CB 260-UL	CB260-120V-O	100-120 V	O_2 control 0-20 vol.-%	9640-0016

Model	Model version	Voltage	Equipment	Art. no.
CBF 170	CBF170-230V	200-230 V		9640-0017
CBF 170	CBF170-230V-O	200-230 V	O_2 control 0-20 vol.-%	9640-0018
CBF 170-UL	CBF170-120V	100-120 V		9640-0019
CBF 170-UL	CBF170-120V-O	100-120 V	O_2 control 0-20 vol.-%	9640-0020
CBF 260	CBF260-230V	200-230 V		9640-0021
CBF 260	CBF260-230V-O	200-230 V	O_2 control 0-20 vol.-%	9640-0022
CBF 260-UL	CBF260-120V	100-120 V		9640-0023
CBF 260-UL	CBF260-120V-O	100-120 V	O_2 control 0-20 vol.-%	9640-0024

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Dear customer,

For the correct operation of the CO_2 incubator, 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

1. Safety

1.1 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.

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.

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 BINDER Service Hotline 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 BINDER 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 ask your dealer or contact us directly, e.g. by phone at the number located on page one of this manual

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 BINDER 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 Intellectual property

This operating manual is protected by copyright. Any unauthorized copying or disclosure to third parties is strictly prohibited. We reserve the right to take legal action and, if necessary, to assert claims for damages in the event of infringement.

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Please visit www.binder-world.com for more information.

1.4 Structure of the safety instructions in the operating manual

In this operating manual, the following safety definitions and symbols indicate dangerous situations following the harmonization of ISO 3864-2 and ANSI Z535.6.

1.4.1 Signal word panel

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.

1.4.2 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.

1.4.3 Pictograms

Warning signs			
Electrical hazard	Hot surface	Explosive atmosphere	Stability hazard
Lifting hazard	Gas cylinders	Suffocation hazard	CO_2 suffocation and poisoning hazard
Explosive substances	Fire promoting agents	Harmful substances	Risk of corrosion and / or chemical burns
Biohazard	Pollution Hazard	Magnetic field	High humidity
Mandatory action signs			
Mandatory regulation	Read operating instructions	Disconnect the power plug	Lift with several persons
Environment protection	Wear protective gloves	Wear safety goggles	

Prohibition signs			
Do NOT touch	Do NOT spray with water		

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

1.4.4 Word message panel structure

Type / cause of hazard.
Possible consequences.
- ➢ Instruction how to avoid the hazard: prohibition
- ➢ Instruction how to avoid the hazard: mandatory action

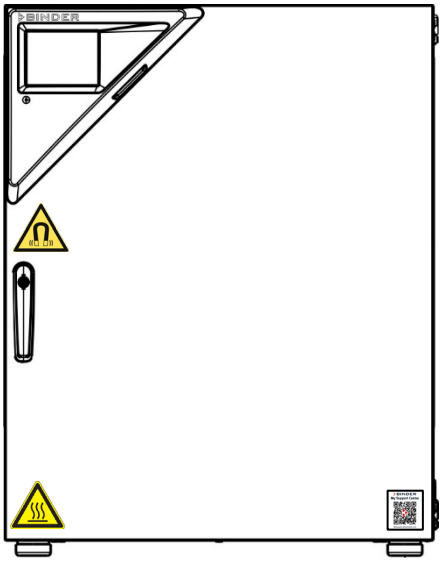
Observe all other notes and information not necessarily emphasized in the same way, in order to avoid disruptions that could result in direct or indirect injury or property damage.

1.5 Localization / position of safety and information labels on the chamber

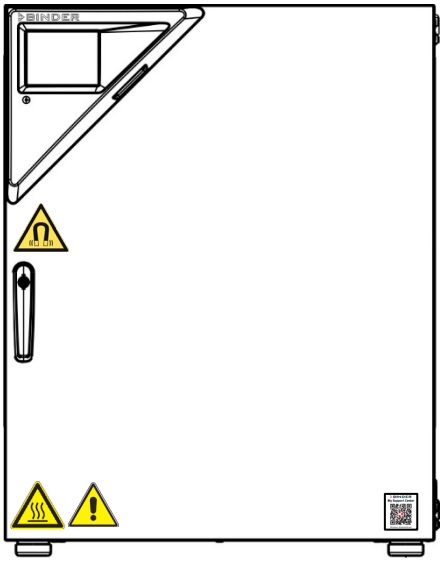
The following labels are located on the chamber:

Pictograms (Warning signs)	
	Hot surface • on the outer chamber door
	Risk of injury • on the outer door: CB-UL / CBF-UL only • above the access ports (option)
	Magnetic field • on the outer door above the door handle
	Observe the prescribed fresh water quality • on the fresh water can accessory for CBF/CBF-UL

Information
BINDER My Support Center MySupport.binder-world.com QR-Code and URL to contact the BINDER Support Center • on the outer chamber door

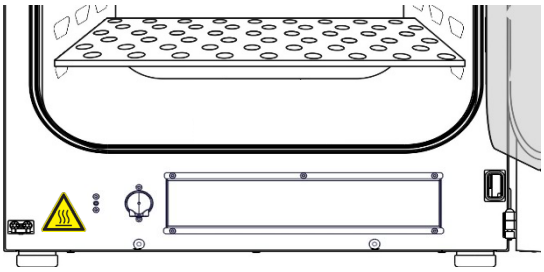


CO_2 incubator CB / CBF

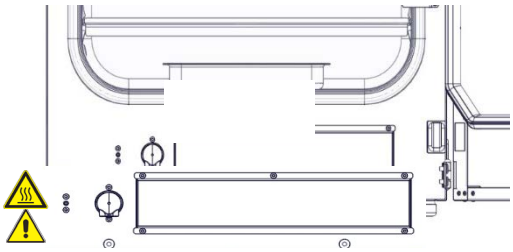


CO_2 incubator CB-UL / CBF-UL

Figure 1: Position of labels on the chamber



CO_2 incubator CBF



CO_2 incubator CBF-UL

Figure 2: Position of additional labels on the CBF / CBF-UL

	Keep safety labels complete and legible.

Replace safety labels that are no longer legible. Contact BINDER service for these replacements.

1.6 Type plate

Position of type plate: left chamber side (seen from front), at the bottom in the middle

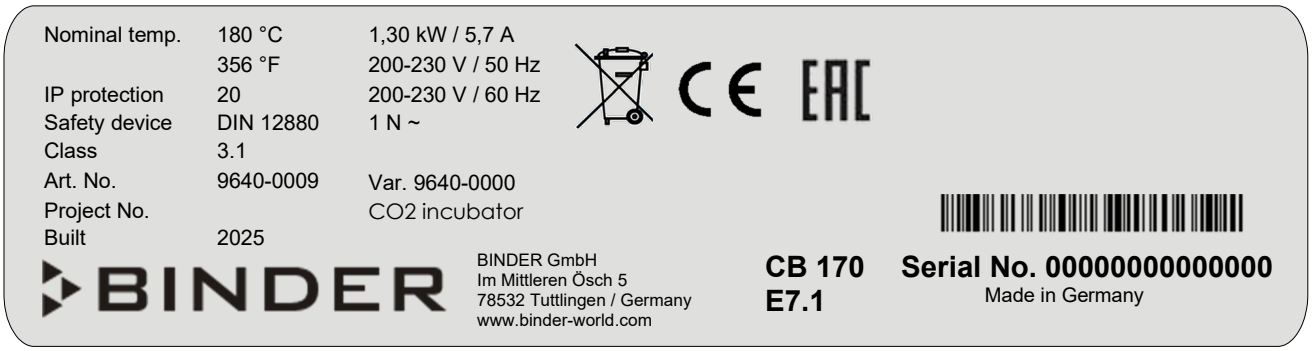


Figure 3: Type plate (example of CB 170 regular chamber)

Indications of the type plate (example)

Indication		Information
BINDER		Manufacturer: BINDER GmbH
CB 170		Model designation
CO2 incubator		Device name
Serial No.	00000000000000	Serial no. of the chamber
Built	2025	Year of construction
Nominal temperature	180 °C 356 °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
Class	3.1	Class of temperature safety device
Art. No.	9640-0009	Art. No. of the chamber
Var.	9640-0025	Variant No. / Equipment
Project No.	---	Optional: Special application acc. to project no.
1,30 kW		Nominal power
200-230 V / 50 Hz		Nominal voltage range +/-10% at the indicated power frequency
200-230 V / 60 Hz		
1 N ~		Current type
5,7 A		Nominal current

Symbols on the type plate

Symbol	Information
CE	CE conformity marking
	Electrical and electronic equipment manufactured / placed on the market in the EC after 13 August 2005 and to be disposed of in separate collection according to Directive 2012/19/EU on waste electrical and electronic equipment (WEEE).
EAC	The chamber is certified according to Customs Union Technical Regulation (CU TR) for the Eurasian Economic Union (Russia, Belarus, Armenia, Kazakhstan Kyrgyzstan).

1.7 UKCA Label

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

Figure 4: UKCA Label

Symbol on the sticker

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

1.8 General safety instructions on installing and operating the CO_2 incubator

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, and DGUV rule 110-007, issued by the employers' liability insurance association).

BINDER GmbH is only responsible for the safety features of the chamber provided skilled electricians or qualified personnel authorized by BINDER 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 BINDER accessories or accessories from third-party suppliers authorized by BINDER. 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. 3.4).

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, as well as the contained moisture constituent and its behavior with the addition of heat energy and humidity (CBF / CBF-UL).

Familiarize yourself with any potential health risks caused by the charging material, the contained moisture constituent or by reaction products which may arise during the temperature process. Take adequate measures to exclude such risks 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 from contamination by toxic, infectious or radioactive substances. ➢ Take suitable protective measures when introducing and removing toxic, infectious or radioactive material

	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).

During and after a sterilization the temperature of the inner surfaces almost equals the set-point. The inner doors, the inner door and glass door handles, and the inner chamber will become hot during a sterilization.

	CAUTION **Danger of burning by touching hot chamber parts during or after a sterilization.** **Burns.** ∅ Do NOT touch the inner surfaces, inner doors, inner door handles, and door gaskets during or after a sterilization.

	WARNING **Danger of injury and damages by the chamber tipping over.** **Injuries and damage to the chamber and the charging material** ∅ Do NOT load the chamber door with heavy objects while it is open.

The chamber is equipped with a permanent magnet located behind the inner panel of the outer chamber door. If persons with active implants (e.g. pacemakers, defibrillators) keep a sufficient safe distance (distance of field source to implant), an influence of these implants can be excluded with high probability.

	WARNING **Magnets can affect the function of pacemakers and implanted defibrillators.** **A pacemaker can be put into test mode and cause discomfort. A defibrillator may not work anymore.** ➢ If you wear such devices, maintain a sufficient safety distance to the chamber door in the area of the door handle. ➢ Warn wearers of such devices of approaching the chamber door.

1.9 Precautions when working with gases

Notes on handling carbon dioxide (CO_2)

Carbon dioxide (CO_2) in high concentrations is hazardous to health. It is colorless and almost odorless and therefore practically imperceptible. Escaping CO_2 gas is heavier than air and accumulates at the ground or possibly in lower-lying parts of the building. There is danger of suffocation and poisoning. Hazards due to uncontrolled gas release must be effectively avoided. Vent out any CO_2 gas that may escape via good room ventilation or a suitable connection to an exhaust system. The installation of a CO_2 warning system is mandatory. It should be located 30 cm / *11.8 in* above ground. The signal must be visible from the outside.

	DANGER **Danger of suffocation and poisoning by high concentration of CO_2 (> 4 Vol.-%).** **Death by suffocation.** ∅ Do NOT set up chambers in non-ventilated recesses. ➢ Ensure technical ventilation measures. ➢ Observe the relevant regulations for handling CO_2. ➢ Close the CO_2 supply when decommissioning the chamber.

Even when CO_2 or systems operated with CO_2 are handled carefully and appropriately, a residual risk remains, which can lead to life-threatening situations under certain circumstances. Therefore, we strongly recommend continuous monitoring of CO_2 concentration in the ambient air of the incubator. It must be ensured permanently that the maximum permissible **occupational exposure limit** for CO_2 is not exceeded (chap. 3.4).

Chamber with O_2 control: **Notes on handling oxygen (O_2)**

Oxygen (O_2) is colorless and almost odorless and therefore practically imperceptible. It promotes burns, which can proceed explosively. There is a fire hazard for flammable oxygenated materials, e.g. clothes and hair. O_2 is heavier than air and may accumulate in low-lying areas.

	DANGER **Danger of fire and explosion through contact of combustible materials with O_2 with high concentration of O_2 (> 21 % O_2).** **Serious injury or death from burns and / or explosion pressure.** ∅ Do NOT set up chambers in non-ventilated recesses. ➢ Ensure technical ventilation measures. ➢ Observe the relevant regulations for handling O_2. ➢ Close the O_2 supply when decommissioning the chamber.

Take appropriate measures to prevent oxygen enrichment and fire and explosion hazards in areas where oxygen enrichment is possible.

	General information for safe handling of oxygen: • Make sure training of personnel on hazards of oxygen enrichment and necessary safety measures. • Make sure adequate labeling of all oxygen equipment and facilities. • Make sure gas tightness of all gas connections by checking them for leaks (e.g. with leak spray or diluted soap solution). • Close the main valve of the source of oxygen after work when not using the chamber. • Never lubricate O_2 equipment with oil or fat. Use only materials and spare parts which are approved for use with oxygen. • Regularly inspect fire extinguishers for proper condition. • Set up emergency showers where oxygen enrichment is possible. • Strictest smoking ban and no ignition sources in areas where oxygen enrichment is possible. • Make sure good ventilation of areas where oxygen enrichment is possible (location of the chamber and/or O_2 cylinders. • Persons who may have been in a possibly oxygen-enriched atmosphere must keep away from ignition sources (flames, cigarettes, etc.) and ventilate their clothes at least 15 minutes. • Always keep emergency routes free.

Chamber with O_2 control: **Notes on handling nitrogen (N_2)**

Nitrogen (N_2) in high concentrations is hazardous to health. It is colorless and almost odorless and therefore practically imperceptible. Any N_2 gas that may escape must be safely led out via good room ventilation or a suitable connection to an exhaust system.

	DANGER **Risk of suffocation through high concentration of N_2.** **Death by suffocation.** ∅ Do NOT set up chambers in non-ventilated recesses. ➢ Ensure technical ventilation measures. ➢ Observe the relevant regulations for handling N_2. ➢ Close the N_2 supply when decommissioning the chamber.

1.10 Precautions when handling gas cylinders

	General information for safe handling of gas cylinders: • Store and use gas cylinders only in well-ventilated locations. • Open the gas cylinder valve slowly to avoid pressure surges. • Secure gas cylinders during storage and use against falling (chaining). • Transport gas cylinders with a cylinder cart, do not carry, roll, or throw them. • Always close the valve even with apparently empty cylinders; screw on the cap when not in use. Return gas cylinders with the valve closed. • Do not open gas cylinders by force. Mark them when damaged. • Protect gas cylinders against fire, e.g. do not store together with flammable liquids. • Observe relevant regulations for dealing with gas cylinders.

Secure the gas cylinders against falling and other mechanical damage.

	WARNING **Risk of injury through sudden release of the stored pressure energy when the safety valve is torn off.** **Injuries.** ➢ Secure gas cylinders against falling (chaining). ➢ Transport gas cylinders with a cylinder cart.

The valve of the gas cylinder **always** must be closed before screwing on or unscrewing the gas hose.

	WARNING **Risk of injury through sudden release of the stored pressure energy when opening the cylinder valve of a not connected cylinder.** **Injuries.** ➢ Close the gas cylinder valve before connecting or removing the gas hose.

	After connecting the gas cylinder, check all gas connections for leaks (e.g. with leak spray or diluted soap solution).

1.11 Intended use

	Following the instructions in this operating manual and conducting regular maintenance work (chap. 22.5) 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

CB / CB-UL and CBF / CBF-UL incubators are suitable for the cultivation of mammal cells under typical conditions of approx. 37 °C / *98.6°F*. The chamber permits setting defined pH conditions by common $NaHCO_3$ buffer systems of commercial cell media by keeping an exact CO_2 atmosphere inside. The chambers guarantee high humidity inside to avoid osmolarity increasing caused by the evaporation of the cell media.

With the chamber with O_2 control, a variable oxygen atmosphere can additionally influence the growth of the cells.

The chambers are suitable for exact conditioning of harmless materials.

Requirements for the chamber load

Any solvent must not be explosive and flammable. Components of the charging material must NOT form an explosive mixture with air. The operating temperature must lie below the flash point or below the sublimation point of the charging material. Any component of the charging material must NOT be able to release toxic gases.

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

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 at working temperature 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 from contamination by toxic, infectious or radioactive substances. ➢ Take suitable protective measures when introducing and removing toxic, infectious or radioactive material

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.

☞	Due to the special demands of the Medical Products legislation, these chambers are not qualified to perform sterilization of 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. 3.4) must be met.

☞	WARNING: If customer should use a BINDER 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.

Relevant regulations for dealing with CO_2 / O_2 / N_2 and gas cylinders must be observed. The installation of a CO_2 warning system is mandatory. It should be located 30 cm / *11.8 in* above ground. The signal must be visible from the outside.

1.12 Foreseeable Misuse

Other applications than those described in chap. 1.11 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 the respective material.
- Failure to comply with the relevant regulations for handling gas cylinders
- Failure to comply with the relevant regulations for handling CO_2 , O_2 or N_2
- Operation of the chamber without a functional CO_2 warning system at the installation site.
- Operation of the chamber without ventilation measures
- 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
- Installation, startup, operation, maintenance or repair of the chamber in absence of operating instructions

- 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 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, the operator shall issue operating instructions. Standard operating procedures (SOPs) are recommended.

1.13 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 hot surfaces on the housing
- Contact with hot surfaces in the interior and inside of 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 heating, gas, or humidifying systems
- 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 BINDER
- Use of replacement parts other than BINDER original replacement parts
- Electrical safety analysis not performed after repairs

1.14 Operating instructions

Depending on the application and location of the chamber, the operator of the chamber must provide the relevant information for safe operation of the chamber in a set of operating instructions.

	Keep these 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.

1.15 Measures to prevent accidents

The operator of the chamber must observe the local and national regulations and take precautions to prevent accidents.

The manufacturer took the following measures to prevent dangers:

- **Indications on the type plate**

  See operating manual chap. 1.6.

- **Operating manual**

  An operating manual is available for each chamber.

- **Overtemperature monitoring**

  The chamber is equipped with a temperature display, which can be read from outside.

  The chamber is equipped with an additional safety controller (temperature safety device class 3.1 acc. to DIN 12880:2007). Visual and audible (buzzer) signals indicate temperature exceeding.

- **Safety, measurement, and control equipment**

  The safety, measuring, and control equipment is 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. power cables). The chamber is equipped with a permanent magnet located behind the inner panel of the outer chamber door. If persons with active implants (e.g. pacemakers, defibrillators) keep a sufficient safe distance (distance of field source to implant), an influence of these implants can be excluded with high probability.

	WARNING
	Magnets can affect the function of pacemakers and implanted defibrillators. **A pacemaker can be put into test mode and cause discomfort. A defibrillator may not work anymore.** ➢ If you wear such devices, maintain a sufficient safety distance to the chamber door in the area of the door handle. ➢ Warn wearers of such devices of approaching the chamber door.

- **Protection against touchable surfaces**

  Tested according to EN ISO 13732-1:2008.

- **Floors**

  See operating manual chap. 3.4 for correct installation

- **Cleaning**

  See operating manual chap. 21.

1.16 CBF / CBF-UL : Resistance of the humidity sensor against harmful substances

The following list of harmful substances refers only to the humidity sensor and does not include any other materials incorporated in the chamber or prohibited substances in relation to explosion protection.

Some gases - especially clean gases - do not have any influence on the humidity sensor. Others do have a very small influence, whereas others may influence the sensor to a larger extent.

- The following gases do not influence the sensor and the humidity measurement: Argon (Ar), carbon dioxide (CO_2),helium (He), hydrogen (H_2), neon (Ne), nitrogen (N_2), nitrous oxide (N_2O), oxygen (O_2)
- The following gases do not or to a minor extent influence the sensor and the humidity measurement: Butane (C_4H_{10}), ethane (C_2H_6), methane (CH_4), natural gas propane (C_3H_8)
- The following gases do not, or to a minor extent influence the sensor and the humidity measurement, provided that the indicated loads are not exceeded:

		Maximum work place threshold limit value		Tolerated concentration with permanent load	
Substance	**Formula**	**ppm**	**mg/m³**	**ppm**	**mg/m³**
Ammonia	NH_3	20	14	5500	4000
Acetone	CH_3COCH_3	500	1200	3300	8000
Benzene		300	1200		150000
Chlorine	Cl_2	0.5	1.5	0.7	2
Acetic acid	CH_3COOH	10	25	800	2000
Ethyl acetate	$CH_3COOC_2H_5$	400	1400	4000	15000
Ethanol	C_2H_5OH	500	960	3500	6000
Ethylene glycol	$HOCH_2CH_2OH$	10	26	1200	3000
Formaldehyde	HCHO	0.3	0.37	2400	3000
Isopropanol	$(CH_3)_2CHOH$	200	500	4800	12000
Methanol	CH_3OH	200	260	3500	6000
Methyl ethyl ketone	$C_2H_5COCH_3$	200	590	3300	8000
Ozone	O_3	0.1	0.2	0.5	1
Hydrochloric acid	HCl	2	3	300	500
Hydrogen sulphide	H_2S	10	15	350	500
Nitrogen oxides	NOx	5	9	5	9
Sulphur dioxide	SO_2	5	13	5	13
Toluol	$C_6H_5CH_3$	100	380	1300	5000
Xylene	$C_6H_4(CH_3)_2$	100	440	1300	5000

These values are to be considered as approximate values. The sensor resistance largely depends on the temperature and humidity conditions during the time of exposure to harmful substances. Avoid simultaneous condensation. Tolerated error of measurement: ± 2 %r.H. The maximum work place threshold limit value is one that can be regarded as harmless for humans.

- Vapors of oil and fat are dangerous for the sensor because they may condensate at the sensor and thus prevent its function (insulating layer). For similar reasons it is not possible to measure smoke gases.

2. Chamber description

The CO_2 incubators CB / CB-UL and CBF / CBF-UL are equipped with a multifunctional microprocessor display controller for temperature, CO_2, and O_2 (chamber with O_2 control) levels and humidity (CBF / CBF-UL) and a digital display accurate to one-tenth of a degree resp. 0.1 vol.-%. With its comprehensive program control functions, the display program controller MB2 permits the high precision performance of temperature, CO_2, O_2 (chamber with O_2 control), and humidity (CBF / CBF-UL) cycles.

Material: The inner chamber and the inside of the doors are all made of stainless steel V2A (German material no. 1.4301, US equivalent AISI 304). The inner surfaces are smooth and therefore easy to clean. The inner chamber is deep-drawn from one piece, polished (suitable for pharmaceutical applications) and has no welds or inaccessible corners. The hinges and the seal of the inner glass door are glued from the outside to aid cleaning of the inner chamber. When operating the chamber at high temperatures (sterilization), the impact of the oxygen in the air may cause discoloration of the metallic surfaces (yellowish-brown or blue) by natural oxidation processes. These colorations are harmless and will in no way impair the function or quality of the chamber. The perforated shelves are also made of stainless steel. You can insert a maximum of 3 (chamber size 56), 6 (chamber size 170), resp. 8 (chamber size 260) shelves. The housing is RAL 7035 or RAL 9003 powder-coated. All corners and edges are also completely coated.

Door lock: The DuoDoor™ door lock offers two to open the outer door and glass door independently or together. The outer door is regularly equipped with a door lock with keys. The standard chamber door is hinged right. The chamber is optionally available with door hinged left.

Sterilization: The chamber's heating system permits hot-air auto-sterilization at a setpoint of 180 °C / *356 °F.* Thus, the effective sterilization temperature is maintained for at least two hours on all internal surfaces, resulting in sterilization of the entire inner chamber. The effectiveness of the sterilization has also been confirmed by an independent research institute.

Temperature safety device Thanks to the regular safety controller (temperature safety device class 3.1 acc. to DIN 12880:2007), the set temperature is maintained in case of failure.

CO_2 system: A highly precise, drift-free CO_2 infrared measuring system in combination with the permanent mixture of CO_2 gas through a special proprietary gas mixing head developed by BINDER allows precise and constant CO_2 concentrations for long periods. This creates optimum growth conditions for cultures. The gas enters the chamber via a fine filter (aseptic filter) with a high filtration efficiency that also filters the smallest particles.

Fast reaction times, maximum accuracy and selectivity characterize the CO_2 measuring procedure of the CO_2 incubators. The accuracy of the CO_2 measuring system is based on an infrared measuring cell with NDIR (non-dispersive infrared) sensor, which continuously regulates to a reference value. Therefore, disturbance variables and aging phenomena in the measuring system are almost completely eliminated, so that this measuring system, in contrast to other measuring procedures, remains practically drift-free between calibrations and is entirely selective for CO_2. The sensor is built into the chamber and can be sterilized.

O_2 control (chamber with O_2 control): The CO_2 incubator is available with O_2 control in addition to CO_2 control. There are two different control ranges:

- Regular equipment: Hypoxic control range **0.2 to 20 vol. % O_2**. Only N_2 can be connected to reduce O_2 concentration; it is not possible to connect O_2 gas bottles to increase O_2 concentration. Control in the low O_2 range is very precise, in particular in the range below 1 vol. % O_2.
- Alternative control range **10 to 90 vol. % O_2** (option). Although the high control range is intended in particular for hyperoxic applications (> 21 vol. % O_2), it is also suitable for slightly hypoxic applications between 10 and 20 vol. % O_2.

The O_2 sensor is a semiconductor gas sensor with ZrO_2 ceramic.

CBF / CBF-UL humidity control: The chamber is equipped with humidity control and a microprocessor-controlled humidification system.

Freshwater is supplied by manually filling a freshwater bag, which is placed behind the chamber door in a recess.

A resistance humidifying system humidifies the air. For this purpose, use deionized (demineralized) water. The option BINDER Pure Aqua Service allows using the chamber with any degree of water hardness.

Controller: The efficient program controller is equipped with a multitude of operating functions, in addition to recorder and alarm functions. Programming of test cycles is easily accomplished via the modern MB2 touch screen controller and is also possible directly with a computer via Intranet in connection with the APT-COM™ 4 Multi Management Software (accessory, chap. 18.1). The chambers are equipped with an Ethernet interface for computer communication. The APT-COM™ 4 Multi Management Software permits networking up to 30 chambers and connecting them to a PC for controlling and programming, as well as recording and representing temperature, CO_2 and O_2 and humidity data. For further options and accessories, see chap. 24.5.

	CB / CB-UL	CBF / CBF-UL
Temperature range:	4 °C / *7.2 °F* above ambient temperature up to *CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*	5 °C / *9 °F* above ambient temperature up to *CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*
Temperature range (chamber with O_2 control):	6 °C / *10.8 °F* above ambient temperature up to *CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*	7 °C / *12.6 °F* above ambient temperature up to *CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*
CO_2 range:	0 vol.-% up to 20 vol.-%	
O_2 range (chamber with O_2 control):	0.2 vol.-% up to 20 vol.-% (hypoxic control range) **or** 10 vol.-% up to 90 vol.-% (optional alternative control range)	
Humidity range (CBF / CBF-UL):	50 % r.h. up to 95 % r.h.	

2.1 Chamber overview

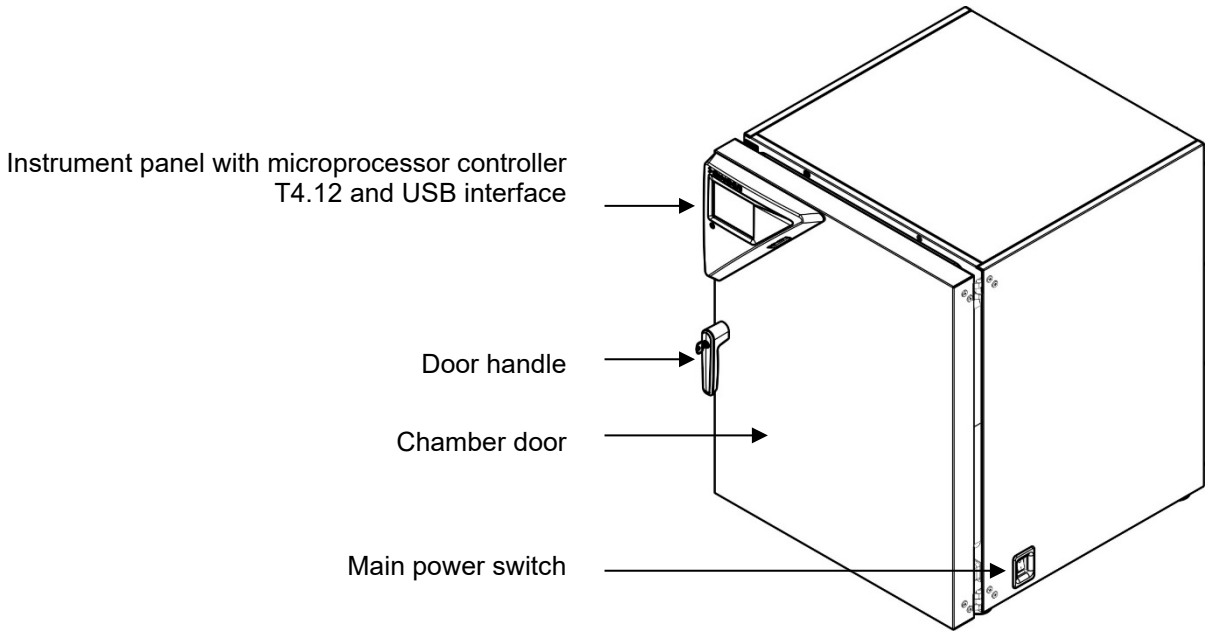


Figure 5: CO_2 incubator (example: model CB 170)

2.2 CB / CB UL inner chamber

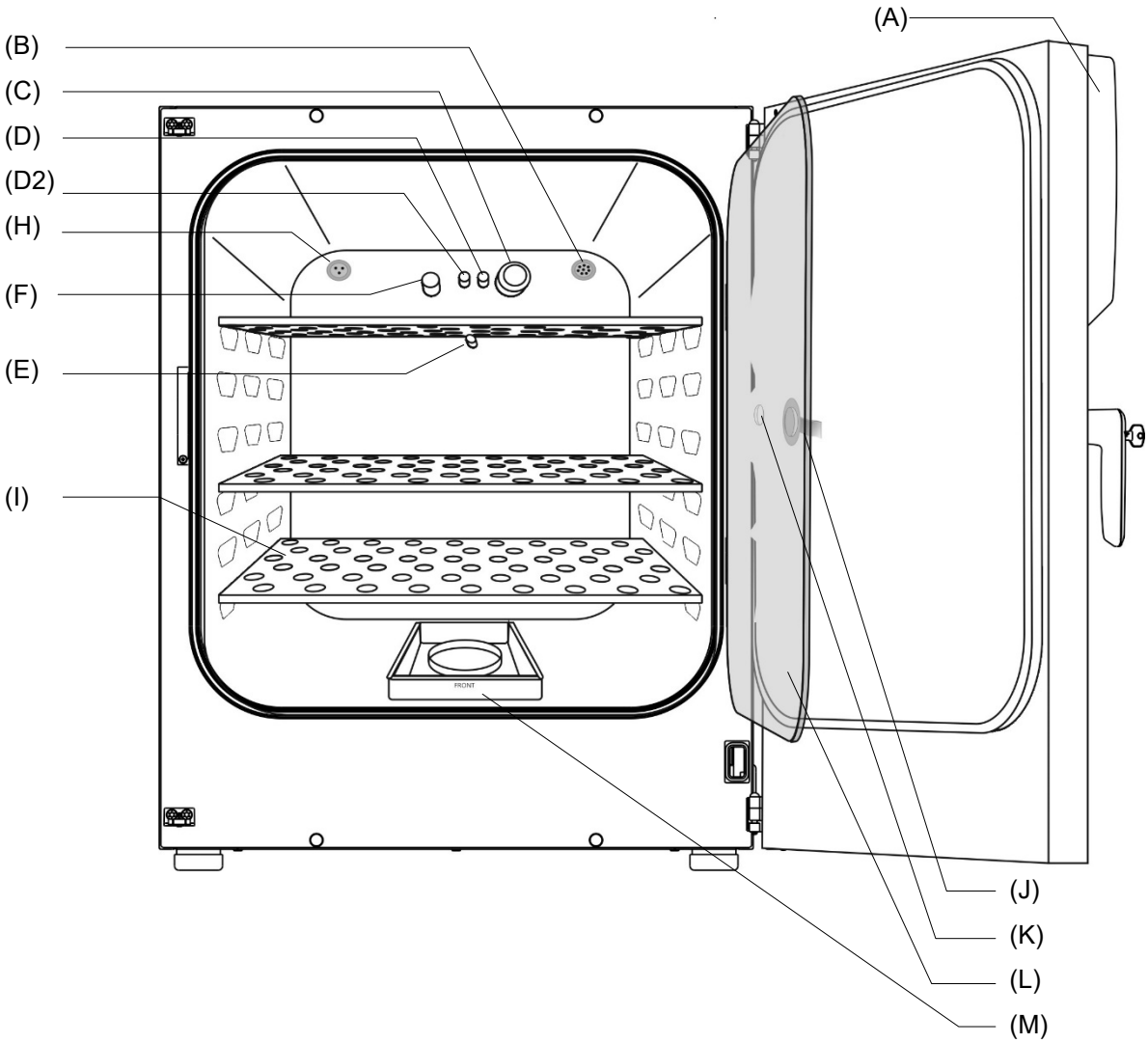


Figure 6: CB 170 with O_2 control and options

(A) Instrument panel with microprocessor program controller MB2, indicating temperature, CO_2, O_2 (chamber with O_2 control)

(B) Connection socket for extra-low voltage supply (option, chap. 18.6)

(C) CO_2 sensor

(D) Gas mixing head CO_2

(D2) Additional gas mixing head O_2/ N_2 (chamber with O_2 control)

(E) Pt 100 temperature probe

(F) O_2 sensor (chamber with O_2 control)

(H) Internal socket 230V (max. 3 A) (option, available via BINDER INDIVIDUAL Customized Solutions, chap. 18.4)

(I) Perforated shelves, made of stainless steel

(J) Glass door handle

(K) Measuring access port

(L) Inner glass doors

(M) Permadry™ water pans

2.3 CBF / CBF UL inner chamber

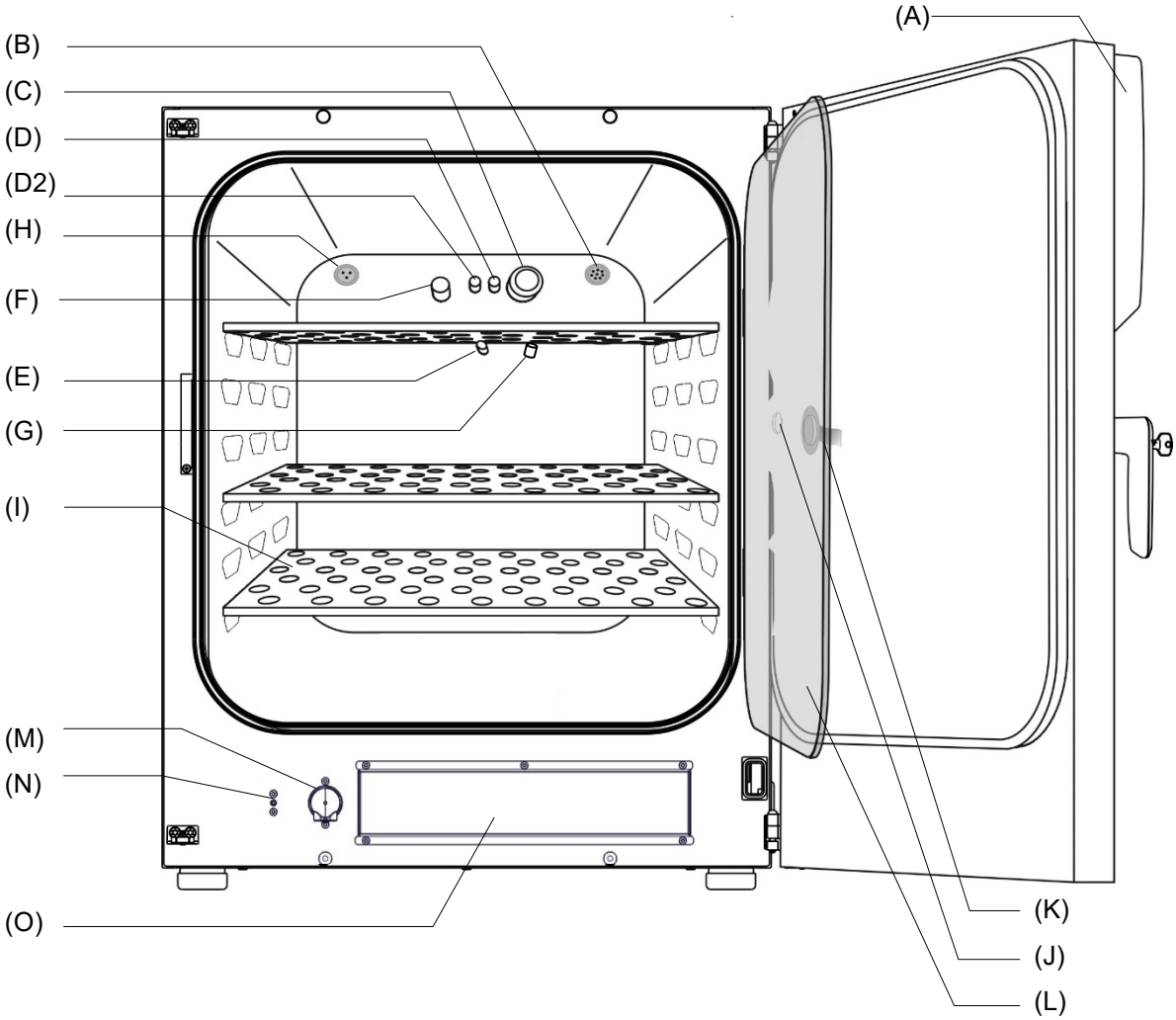


Figure 7: CBF 170 with O_2 control and options

(A) Instrument panel with microprocessor program controller MB2, indicating temperature, CO_2, O_2 (chamber with O_2 control) and humidity

(B) Connection socket for extra-low voltage supply (option, chap. 18.6)

(C) CO_2 sensor

(D) Gas mixing head CO_2

(D2) Additional gas mixing head O_2/ N_2 (chamber with O_2 control)

(E) Pt 100 temperature probe

(F) O_2 sensor (chamber with O_2 control)

(G) Humidity sensor

(H) Internal socket 230V (max. 3 A) (option, available via BINDER INDIVIDUAL Customized Solutions, chap. 18.4)

(I) Perforated shelves

(J) Glass door handle

(K) Measuring access port

(L) Inner glass door

(M) Pump

(N) Water connection for silicone tube

(O) Opening for freshwater bag

2.4 Control panel on the rear of the chamber

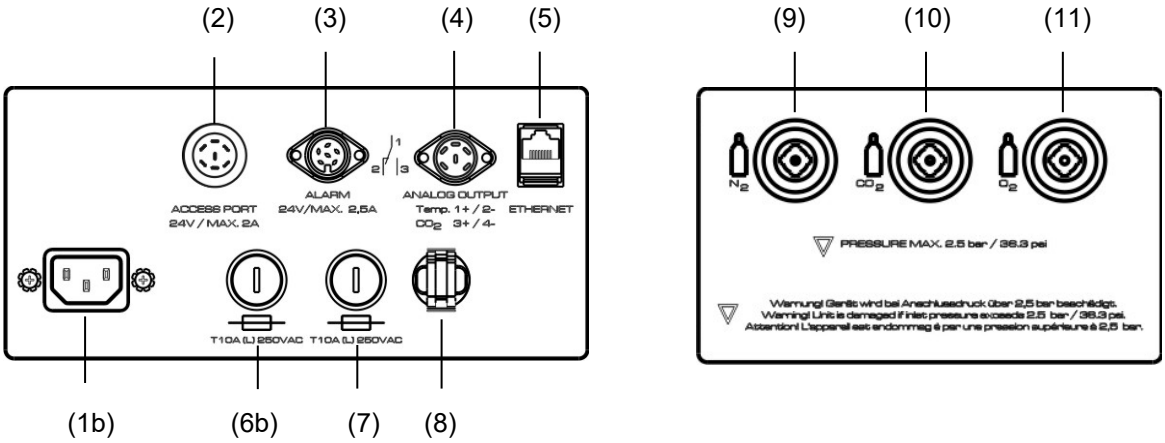


Figure 8: Rear control panel CB with O_2 control and options

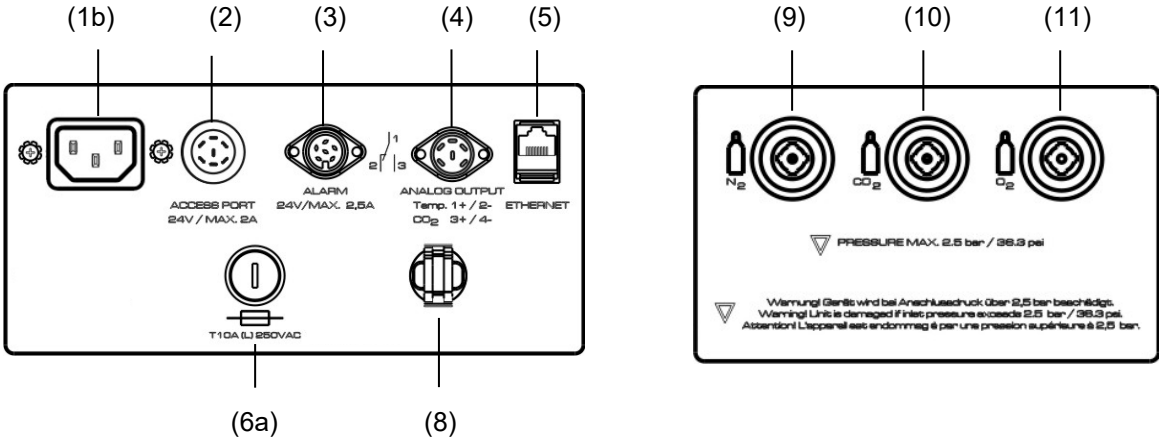


Figure 9: Rear control panel CB-UL with O_2 control and options

(1a) Socket for IEC connector plug / power cable 100-120 V AC

(1b) Socket for IEC connector plug / power cable 230 V AC

(2) External socket for extra-low voltage supply (option for chamber size 170 / 260, chap. 18.6)

(3) DIN-socket for zero-voltage relay alarm outputs

(4) DIN socket for analog outputs 4-20 mA (option, chap. 18.5)

(5) Ethernet interface for computer communication

(6a) Miniature fuse T12,5 A (L) 250 V AV for 100-120 V chamber

(6b) Miniature fuse T10 A (L) 250 V AC for 200-230 V chamber

(7) Miniature fuse T10 A (L) 250 V AC for 200-230 V chamber

(8) Strain relief for power cable

(9) Quick acting closure socket for N_2 (chamber with O_2 control)

(10) Quick acting closure socket for CO_2

(11) Quick acting closure socket for O_2 (chamber with O_2 control with optional alternative control range 10 up to 90 vol.-% O_2)

2.5 Instrument panel

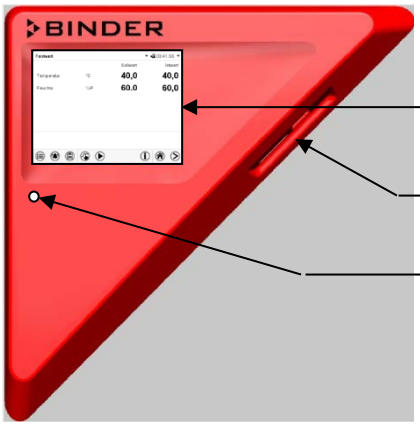


Figure 10: Instrument panel with MB2 program controller and USB interface

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

3.1 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.

The final tests of the manufacturer may have caused 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.

CAUTION

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

Injuries, damage to the chamber.

∅ Do NOT lift or transport the chamber using the door handle or the door.

➢ Lift the chamber from the pallet at the four lower corners with the aid of four people.

If you need to return the chamber, please use the original packing and observe the guidelines for safe lifting and transportation (chap. 3.2).

For disposal of the transport packing, see chap. 23.1.

Note on second-hand chambers (Ex-Demo-Units):

Second-hand chambers are chambers that were used for a short time for tests or exhibitions. They are thoroughly tested before resale. BINDER ensures that the chamber is technically sound and will work flawlessly.

Second-hand chambers are marked with a sticker on the chamber door. Please remove the sticker before commissioning the chamber.

3.2 Guidelines for safe lifting and transportation

After operation, please observe the guidelines for temporary decommissioning (chap. 23.2). Empty the Permadry™ water pan before moving the chamber (CB / CB-UL). In case of any spilling of the contents, shut down the chamber and dry it out carefully and completely (CB / CB-UL).

CAUTION

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

Injuries, damage to the chamber.

- ➢ Transport the chamber in its original packaging only.
- ➢ For moving or shipping, secure the chamber with transport straps.
- ∅ Do NOT lift or transport the chamber using the door handle or the door.
- ➢ Lift the chamber at the four lower corners with the aid of 4 people and place it on a rolling pallet.
- ➢ Move the chamber to the desired location and lift it from the rolling pallet with the aid of four people.

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

You can order transport packing for moving or shipping purposes from BINDER service.

Permissible ambient temperature range during transport:

- If the humidifying system has NOT been emptied: +3 °C / *37.4 °F* to +60 °C / *140 °F*.
- After emptying the humidifying system (after sterilization): -10 °C / *14 °F* to +60 °C / *140 °F*.

With temperatures below +3 °C / *37.4 °F*, water must be completely removed from the humidifying system.

NOTICE

Danger of freezing in the steam generator when transporting the chamber below +3 °C / 37.4 °F with filled steam humidifying system.

Damage to the chamber.

- ➢ Before any transportation below +3 °C / *37.4 °F* , empty the freshwater bag to remove water from the humidifying system and perform a sterilization.

3.3 Storage

Intermediate storage of the chamber is possible in a closed and dry room. Observe the guidelines for temporary decommissioning (chap. 23.2).

Permissible ambient temperature range during storage:

- If the humidifying system has NOT been emptied: +3 °C / *37.4 °F* to +60 °C / *140 °F*.
- After emptying the humidifying system (after sterilization): -10 °C / *14 °F* to +60 °C / *140 °F*

With temperatures below +3 °C / *37.4 °F*, water must be completely removed from the humidifying system.

NOTICE

Danger of freezing in the steam generator when storing the chamber below +3 °C / 37.4 °F with filled steam humidifying system.

Damage to the chamber.

- ➢ Before any storage below +3 °C / *37.4 °F*, empty the freshwater bag to remove water from the humidifying system and perform a sterilization.

- **Permissible ambient humidity:** max. 70 % r.h., non-condensing.

After extensive operation at humidity levels > 70% r.h., condensation from excessive humidity can lead to corrosion during storage. In this case the chamber must first be dried.

	NOTICE
	Danger of corrosion on the housing due to condensation by excess humidity after operating at humidity values > 70 % r.h. for a long period. **Damage to the chamber.** ➢ Let the chamber dry for several days before shut-down: • CB / CB-UL: Empty the Permadry water pan. • CBF / CBF-UL: Turn off humidity control (chap. 6.7). • Set the temperature set point to 50 °C / *122 °F* for approx. 2 hours. • Only then, shut down the chamber at the main power switch (1) and empty the freshwater bag (CBF / CBF-UL).

When after storage in a cold location you transfer the chamber to its warmer installation site, condensation may form. Before start-up, wait at least one hour until the chamber has attained ambient temperature and is completely dry.

CBF / CBF-UL: In case of a prolonged temporal decommissioning: Leave the chamber door open or remove the optional access port plugs.

	NOTICE
	Danger of condensation on the CO_2 sensor head following turning off the incubator. **Error messages, chamber malfunction.** ➢ Each time the chamber is turned off at the main power switch: Pull off the filter cap of the CO_2 sensor and let it dry until no more condensation is visible. Put the filter cap back on. ➢ For temporary decommissioning, open all doors, empty the water basin (CB / CB-UL) and allow the chamber to dry for at least 1 hour.

3.4 Location of installation and ambient conditions

Notes on the location of installation

Set up the chamber on a flat, even surface, free from vibration and in a well-ventilated, dry location. The chambers are designed for setting up inside a building (indoor use).

Freestanding chamber are suitable for installation on tables or on the stand (height 200 mm / *0.5 ft*) available as accessory. Note: The site of installation must be capable of supporting the chamber's weight (see technical data, chap.24.4).

Align the chamber using a spirit level to ensure even covering of the cell-cultures with the medium. For this purpose, manually adjust the four chamber feet.

The chambers can be stacked on top of each other (two chambers maximum). For safe stacking that is easy to maintain, use the original BINDER stacking stand (chap. 18.8.2) or the base on castors (chap. 18.8.3).

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.

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

In order to avoid contamination, never place the chamber directly on the floor.

	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.

Do not install or operate the chamber 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 explosive dust or air-solvent mixtures AWAY from the vicinity of the chamber.

Ambient conditions

- Permissible ambient temperature range for operation: +18 °C / *64.4 °F* to +30 °C / *86 °F;* CB 56: 20 °C / *68.0 °F* to +30 °C / *86 °F*

  At elevated ambient temperature values, fluctuations in temperature and humidity may occur.
- Ideal ambient temperature: at least 7 °C / *12.6 °F* below the intended working temperature. E.g., working temperature 37 °C / *98.6 °F* = ambient temperature 30 °C / *86 °F* and lower. In the event of working temperatures of less than 7 °C / *12.6 °F* above the ambient temperature, the setpoint can be exceeded.

Do not place the chamber directly below the air outlet of an air conditioner.

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

	Avoid direct solar radiation on the chamber. Avoid strong drafts, e.g. by air conditioning.

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

Minimum distances

- Wall distances: rear 100 mm / *3.94 in*, sides 50 mm / *1.97 in*.

	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.

Notes on handling carbon dioxide (CO_2)

Carbon dioxide (CO_2) in high concentrations is hazardous to health. It is colorless and almost odorless and therefore practically imperceptible. Escaping CO_2 gas is heavier than air and accumulates at the ground or possibly in lower-lying parts of the building. There is danger of suffocation and poisoning. Hazards due to uncontrolled gas release must be effectively avoided. Vent out any CO_2 gas that may escape via good room ventilation or a suitable connection to an exhaust system. The installation of a CO_2 warning system is mandatory. It should be located 30 cm / *11.8 in* above ground. The signal must be visible from the outside.

DANGER

Danger of suffocation and poisoning by high concentration of CO_2 (> 4 Vol.-%).
Death by suffocation.

∅ Do NOT set up chambers in non-ventilated recesses.
➢ Ensure technical ventilation measures.
➢ Observe the relevant regulations for handling CO_2.

Observe the **occupational exposure limit OEL** for CO_2 set by the national authorities (formerly maximum permitted workplace concentration). Check compliance when operating all chambers located in the room.

- OEL for Germany: 5000 ml/m³ (ppm) = 0,5 Vol.-%
- CO_2 lost from incubator size 170 at 5 vol.-% CO_2 with each opening the door: about 14.8 g, i.e. 0.00758 cubic meters / *0.268 cubic feet* (under normal pressure)
- CO_2 lost during 12h at 5 vol.-% without opening the door: approx. < 2 g, i.e. 0.001 cubic meter / *0.035 cubic feet* (under normal pressure 1013 mbar / *14.7 psi*)

An example of how to evaluate laboratory volume and air change rate:

Question: Is an air change rate of 1/h sufficient for a lab with a volume of 100 cubic meters / *3,531.5 cubic feet* with 10 CO_2 incubators size 170, opened 4 times per hour?

Calculation: CO_2 concentration = CO_2 lost by opening the door, multiplied by 10 incubators, multiplied by opening the door 4 times per hour, divided by lab volume

0.00758 cubic meters x 10 x 4 div. 100 cubic meters = 0.003032, i.e. 0.303 % or 3032 ppm.

0.2676852 cubic feet x 10 x 4 div. *3,531.467 cubic feet* = 0.003032, i.e. 0.303 % or 3032 ppm.

Result: The maximum permissible value of 5000 ppm is not exceeded under these operation conditions.

Even when CO_2 or systems operated with CO_2 are handled carefully and appropriately, a residual risk remains, which can lead to life-threatening situations under certain circumstances. Therefore we strongly recommend continuous monitoring of CO_2 concentration in the ambient air of the CO_2 incubator. It must be ensured permanently that the maximum permissible occupational exposure limit OEL for CO_2 (0.5 vol -% CO_2 for Germany) is not exceeded.

***Chamber with O_2 control:* Notes on handling oxygen (O_2)**

Oxygen (O_2) is colorless and almost odorless and therefore practically imperceptible. It promotes burns, which can proceed explosively. There is a fire hazard for flammable oxygenated materials, e.g. clothes and hair. O_2 is heavier than air and may accumulate in low-lying areas.

DANGER

Danger of fire and explosion through contact of combustible materials with O_2 with high concentration of O_2 (> 21 % O_2).
Serious injury or death from burns and / or explosion pressure.

∅ Do NOT set up chambers in non-ventilated recesses.
➢ Ensure technical ventilation measures.
➢ Observe the relevant regulations for handling O_2.

Take appropriate measures to prevent oxygen enrichment and fire and explosion hazards in areas where oxygen enrichment is possible.

	General information for safe handling of oxygen: • Make sure training of personnel on hazards of oxygen enrichment and necessary safety measures. • Make sure adequate labeling of all oxygen equipment and facilities. • Make sure gas tightness of all gas connections by checking them for leaks (e.g. with leak spray or diluted soap solution). • Close the main valve of the source of oxygen after work when not using the chamber. • Never lubricate O_2 equipment with oil or fat. Use only materials and spare parts which are approved for use with oxygen. • Regularly inspect fire extinguishers for proper condition. • Set up emergency showers where oxygen enrichment is possible. • Strictest smoking ban and no ignition sources in areas where oxygen enrichment is possible. • Make sure good ventilation of areas where oxygen enrichment is possible (location of the chamber and/or O_2 cylinders. • Persons who may have been in a possibly oxygen-enriched atmosphere must keep away from ignition sources (flames, cigarettes, etc.) and ventilate their clothes at least 15 minutes. • Always keep emergency routes free.

***Chamber with O_2 control:* Notes on handling nitrogen (N_2)**

Nitrogen (N_2) in high concentrations is hazardous to health. It is colorless and almost odorless and therefore practically imperceptible. Any N_2 gas that may escape must be safely led out via good room ventilation or a suitable connection to an exhaust system.

	DANGER
	Risk of suffocation through high concentration of N_2. **Death by suffocation.** ∅ Do NOT set up chambers in non-ventilated recesses. ➢ Ensure technical ventilation measures. ➢ Observe the relevant regulations for handling N_2.

4. Installation and connections

4.1 Shelves

You can put the shelves in different positions at the line of channel beads in the inner chamber. Hold the shelf straight and then insert it so it will go smoothly inside the chamber.

Permitted shelf loads:

- Maximum load of one single shelf: 10 kg / 22 lb.
- Maximum total load of all shelves: Incubator size 56 / 170: 30 kg / *66 lb.*
Incubator size 260: 40 kg / *88 lb*

4.2 Permadry™ water pan (CB / CB-UL)

The Permadry™ system developed by BINDER is an effective and easy to handle system that ensures high humidity inside the chamber without any condensation forming on the inner surfaces. The Permadry™ water pan consists of two pans in which the outer one is heated and the inner one cooled. With the slight difference of temperature caused by that cooling, the central pan is the specific point for condensation of the surplus humidity. Therefore, all other inner surfaces remain dry.

Incubator size 56

Incubator size 170

Incubator size 260

Figure 11: Permadry™ water pan

- Incubators size 56: Put the water pan in lengthwise direction on the bottom of the inner chamber between the notches in the chamber bottom. Incubators size 170 / 260: Put the Permadry™ water pan on the bottom of the inner chamber in a way that both notches lock into place.
- Incubators size 170 / 260: The front side of the Permadry™ water pan for incubators size 170 / 260 is marked “FRONT”.

Figure 12: Letters “FRONT” indicating the front of the Permadry™ water pan for incubators size 170 / 260

- Please make sure that the Permadry™ water pan has firm contact to the inner chamber bottom and rests tightly on it (notches locked into place).
- Incubators size 56: Fill the pan with distilled, sterilized water up to the filling level marking on the inner edge. Maximum filling quantity: approx. 1.0 liters.
- Incubators size 170 / 260: Fill only the outer pan with distilled, sterilized water up to the filling level marking on the edge of the inner pan. Maximum filling quantity of the outer basin: incubator size 170: approx. 1.3 liters, incubator size 260: approx. 2.0 liters.

Figure 13: Incubators size 56,
Filling height line of the pan

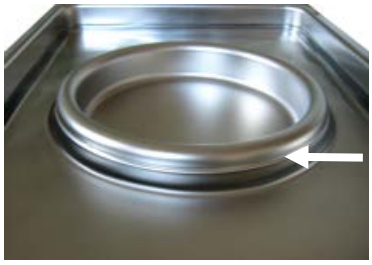


Figure 14: Incubators size 170 / 260,
Filling height line of the outer basin

- We recommend cleaning and refilling the pans 2 to 3 times a week. For evacuation, remove the Permadry™ water pan.
- We recommend using distilled, sterile water to achieve optimum growth results. Any corrosive damage that may arise following the use of water of different quality or by additives is excluded from the liability agreement.

☞	We recommend the BINDER filling water (1000 ml sterile water in water bottles). Art. No. 1007-0327 for the single bottle, Art. No. 8009-1192 for set of 6 bottles

- If required, you can add microbiologically inhibiting substances such as copper chips, copper sulfate or ethylene diamine tetra-vinegar acid (EDTA) in a concentration of 1 to 5 mmol/l.

Empty the Permadry™ water pan before moving the chamber. In case of the contents spilling, immediately shut down the chamber and dry it carefully and completely.

4.3 Connecting the O_2 sensor (chamber with O_2 control)

The O_2 sensor is supplied with the chamber in a separate package.

	Connect or remove the O_2 sensor only when the chamber is turned off.

Open the door of the inner chamber and plug the O_2 sensor (F) into the left connection socket located in the upper part of the rear of the inner chamber. Pay attention to the correct positioning of the pins.

Figure 15: O_2 sensor

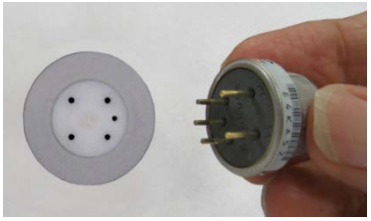


Figure 16: Connecting the O_2 sensor

	The O_2 sensor must be plugged in during a hot-air sterilization.

4.4 Gas connections

	General information for safe handling of gas cylinders: • Store and use gas cylinders only in well-ventilated areas. • Open the gas cylinder valve slowly to avoid pressure surges. • Secure gas cylinders during storage and use against falling (chaining). • Transport gas cylinders with a cylinder cart, do not carry, roll, or throw them. • Always close the valve even with apparently empty cylinders; screw on the cap when not in use. Return gas cylinders with the valve closed. • Do not open gas cylinders by force. Mark them when damaged. • Protect gas cylinders against fire, e.g. do not store together with flammable liquids. • Observe relevant regulations for dealing with gas cylinders.

Secure the gas cylinders against falling and other mechanical damage.

	WARNING
	Risk of injury through sudden release of the stored pressure energy when the valve safety is torn off. **Injuries.** ➢ Secure gas cylinders against falling (chaining). ➢ Transport gas cylinders with a cylinder cart.

The valve of the gas cylinder **always** must be closed before screwing on or unscrewing the gas hose.

	WARNING
	Risk of injury through sudden release of the stored pressure energy when opening the cylinder valve of a not connected cylinder. **Injuries.** ➢ Close the gas cylinder valve before connecting or removing the gas hose.

	After connecting the gas cylinder, check all gas connections for leaks (e.g. with leak spray or diluted soap solution).

4.4.1 Connection of the CO_2 gas cylinder

Carbon dioxide (CO_2) in high concentrations is hazardous to health. It is colorless and almost odorless and therefore practically imperceptible. Escaping CO_2 gas is heavier than air and accumulates at the ground or possibly in lower-lying parts of the building. There is danger of suffocation and poisoning. Hazards due to uncontrolled gas release must be effectively avoided. Vent out any CO_2 gas that may escape via good room ventilation or a suitable connection to an exhaust system. The installation of a CO_2 warning system is mandatory. It should be located 30 cm / *11.8 in* above ground. The signal must be visible from the outside.

DANGER

Danger of suffocation and poisoning by high concentration of CO_2 (> 4 Vol.-%).
Death by suffocation.

- ∅ Do NOT set up chambers in non-ventilated recesses.
- ➢ Ensure technical ventilation measures.
- ➢ Observe the relevant regulations for handling CO_2.
- ➢ Close the CO_2 supply when decommissioning the chamber.

	The CO_2 gas necessary for operation must have a technical grade of 99.5 %.

	The gas connections must be established by qualified personnel who are trained in handling the respective gases and familiar with the required safety measures.

The following steps are required:

Ensuring the correct CO_2 output pressure

	A gas supply pressure above 2.5 bar / *36 psi* will result in chamber damage.

Use a pressure reducer and make sure to avoid any excessive outlet pressure when connecting the gas hose to the chamber.

The real outlet pressure of gas cylinders, sets of gas cylinders or central gas supplies am on the second manometer must **not** exceed 2.5 bar / *36 psi*.

NOTICE

Danger of damage by excessive outlet pressure > 2.5 bar / *36 psi*.
Damage to the chamber.

- ∅ The outlet pressure must NOT exceed the indicated value of 2.5 bar / *36 psi.*
- ➢ Before connecting, check the outlet pressure on the pressure reducer of the cylinder.
- ➢ Adjust the outlet pressure to 2.0 bar / *29 psi* above the ambient pressure.

Observe the correct outlet pressure also when replacing the gas cylinders.

Establishing the connection to the chamber

Connect the supplied gas hose (internal diameter 6 mm / *0.24 inches*) to the pressure reducer of the gas cylinders or central gas supply and secure the connection with the supplied hose clamp.

Connect the pre-assembled hose nozzle of the gas hose to the quick acting closure socket (10) DN 6 on the chamber rear, as described in chap. 4.4.4.

Leak test

After connecting the gas cylinder, check all gas connections for leaks (e.g. with leak spray or diluted soap solution).

	The recovery times of the gas concentrations inside the chamber after opening the door are indicated in the technical data (chap. 24.4) and refer to a connection pressure of 2.0 bar / *29 psi*. Decreasing supply pressure will result in longer recovery times.

Conversion table for gas inlet pressures, bar – psi, see chap. 24.8.

4.4.2 Connection of the O_2 gas cylinder (chamber with O_2 control with optional alternative control range 10 up to 90 vol.-% O_2)

	Note: Do not connect the O_2 cylinder or disconnect the gas supply (by pulling off the gas hose) when operating at setpoints below 19 vol.-% O_2.

Oxygen (O_2) is colorless and almost odorless and therefore practically imperceptible. It promotes burns, which can proceed explosively. There is a fire hazard for flammable oxygenated materials, e.g. clothes and hair. O_2 is heavier than air and may accumulate in low-lying areas.

	DANGER
	Danger of fire and explosion through contact of combustible materials with O_2 with high concentration of O_2 (> 21 % O_2). **Serious injury or death from burns and / or explosion pressure.** ∅ Do NOT set up chambers in non-ventilated recesses. ➢ Ensure technical ventilation measures. ➢ Observe the relevant regulations for handling O_2. ➢ Close the O_2 supply when decommissioning the chamber.

	The O_2 gas necessary for operation must have a technical grade of 99.5 %.

	The gas connections must be established by qualified personnel who are trained in handling the respective gases and familiar with the required safety measures.

The following steps are required:

Ensuring the correct O_2 output pressure

	A gas supply pressure above 2.5 bar / *36 psi* will result in chamber damage.

Use a pressure reducer and make sure to avoid any excessive outlet pressure when connecting the gas hose to the chamber.

The real outlet pressure of gas cylinders, sets of gas cylinders or central gas supplies am on the second manometer must **not** exceed 2.5 bar / *36 psi*.

	NOTICE
	Danger of damage by excessive outlet pressure > 2.5 bar / *36 psi*. **Damage to the chamber.** ∅ The outlet pressure must NOT exceed the indicated value of 2.5 bar / *36 psi.* ➢ Before connecting, check the outlet pressure on the pressure reducer of the cylinder. ➢ Adjust the pressure to 2.0 bar / *29 psi* above the ambient pressure.

Observe the correct outlet pressure also when replacing the gas cylinders.

Establishing the connection to the chamber

Connect the supplied gas hose (internal diameter 6 mm / *0.24 inches*) to the pressure reducer of the gas cylinders or central gas supply and secure the connection with the supplied hose clamp.

Connect the pre-assembled hose nozzle of the gas hose to the quick acting closure socket (11) DN 6 on the chamber rear, as described in chap. 4.4.4.

Leak test

After connecting the gas cylinder, check all gas connections for leaks (e.g. with leak spray or diluted soap solution).

	The recovery times of the gas concentrations inside the chamber after opening the door are indicated in the technical data (chap. 24.4) and refer to a connection pressure of 2.0 bar / *29 psi*. Decreasing supply pressure will result in longer recovery times.

Conversion table for gas inlet pressures, bar – psi, see chap. 24.8.

4.4.3 Connection of the N_2 gas cylinder (chamber with O_2 control)

Nitrogen (N_2) in high concentrations is hazardous to health. It is colorless and almost odorless and therefore practically imperceptible. Any N_2 gas that may escape must be safely led out via good room ventilation or a suitable connection to an exhaust system.

	DANGER
	Risk of suffocation through high concentration of N_2. **Death by suffocation.** ∅ Do NOT set up chambers in non-ventilated recesses. ➢ Ensure technical ventilation measures. ➢ Observe the relevant regulations for handling N_2. ➢ Close the N_2 supply when decommissioning the chamber.

	The N_2 gas necessary for operation must have a technical grade of 99.5 %.

	The gas connections must be established by qualified personnel who are trained in handling the respective gases and familiar with the required safety measures.

The following steps are required:

Ensuring the correct N_2 output pressure

	A gas supply pressure above 2.5 bar / *36 psi* will result in chamber damage.

Use a pressure reducer and make sure to avoid any excessive outlet pressure when connecting the gas hose to the chamber.

The real outlet pressure of gas cylinders, sets of gas cylinders or central gas supplies am on the second manometer must **not** exceed 2.5 bar / *36 psi*.

	NOTICE
	Danger of damage by excessive outlet pressure > 2.5 bar / *36 psi*. **Damage to the chamber.** ∅ The outlet pressure must NOT exceed the indicated value of 2.5 bar / *36 psi.* ➢ Before connecting, check the outlet pressure on the pressure reducer of the cylinder. ➢ Adjust the pressure to 2.0 bar / *29 psi* above the ambient pressure.

Observe the correct outlet pressure also when replacing the gas cylinders.

Establishing the connection to the chamber

Connect the supplied gas hose (internal diameter 6 mm / *0.24 inches*) to the pressure reducer of the gas cylinders or central gas supply and secure the connection with the supplied hose clamp.

Connect the pre-assembled hose nozzle of the gas hose to the quick acting closure socket (9) DN 6 on the chamber rear, as described in chap. 4.4.4.

Leak test

After connecting the gas cylinder, check all gas connections for leaks (e.g. with leak spray or diluted soap solution).

	The recovery times of the gas concentrations inside the chamber after opening the door are indicated in the technical data (chap. 24.4) and refer to a connection pressure of 2.0 bar / *29 psi*. Decreasing supply pressure will result in longer recovery times.

Conversion table for gas inlet pressures, bar – psi, see chap. 24.8.

4.4.4 Connecting the gas hose to the chamber rear (for CO_2, O_2, N_2)

The procedure of connecting the gas hose to the chamber rear is the same for any gas connection. All quick acting closure sockets (CO_2, N_2 with O_2 control, and O_2 with O_2 control and optional alternative control range 10 up to 90 vol.-% O_2) are degreased and supplied with a FKM gasket.

Note for chambers with O_2 control: The quick acting closure socket and the hose nozzle for the O_2 connection must be degreased.

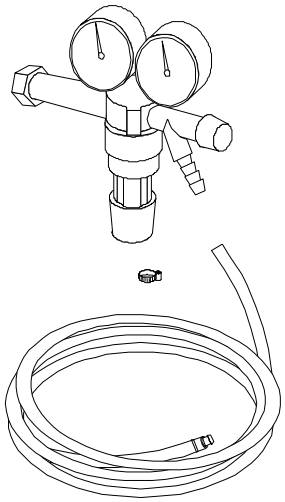
	DANGER
	Fire and explosion hazard through contact of fat with O_2. **Serious injury or death from burns and / or explosion pressure.** ∅ All connection parts for the O_2 connection must be degreased.

The gas hose, which will be used to establish the connection to a gas cylinder, is already attached to the hose nozzle and secured by a hose clamp. Plug the hose nozzle into the corresponding quick acting closure socket (a) located at the rear of the chamber.

	Only use the supplied hose nozzle to connect to the quick acting closure socket. Otherwise, the quick acting closure socket may leak, and/or it may become impossible to connect the original hose nozzle. In this case, please contact BINDER Service.

Now fit the hose nozzle (c) in the quick acting closure socket. To remove the connection, pull the hose nozzle off the quick acting closure socket.

4.4.5 Gas cylinder connection kits (accessory)



Gas cylinder connection kits are available for CO_2 (Art. No. 8012-0014), O_2 (Art. No. 8012-0015) and N_2 (Art. No. 8012-0016).

The connection kit includes the following parts for connecting a gas cylinder to the CO_2 incubator:

- Pressure reducer with manometers for cylinder pressure (high pressure gauge) and outlet pressure (low pressure gauge)
- 5 m pressure hose with pre-assembled hose nozzle for quick acting closure socket
- 1 hose clamp to connect the gas hose to the pressure reducer

Figure 17: Gas cylinder connection kit

	NOTICE
	Danger of damage by excessive outlet pressure > 2.5 bar / *36 psi*. **Damage to the chamber.** ∅ The outlet pressure must NOT exceed the indicated value of 2.5 bar / *36 psi.* ➢ Before connecting, check the outlet pressure on the pressure reducer of the cylinder. ➢ Adjust the outlet pressure to 2.0 bar / *29 psi* above the ambient pressure.

	The gas connections must be established by qualified personnel who are trained in handling the respective gases and familiar with the required safety measures.

4.5 CBF / CBF-UL: Water supply and dehumidification

4.5.1 General remarks on water supply

4.5.1.1 Water supply

Freshwater supply is possible in three ways:

- manually filling a freshwater bag (tubular bag set, standard, can be reordered)
- manually filling a freshwater can (water container set accessory)
- connecting a prefilled water bottle (humidification water set accessory).

It is not possible to connect the chamber directly to a water pipe.

When the freshwater container is empty, the message “Freshwater supply” will be displayed on the controller, the buzzer sounds, and the humidification module turns off. After acknowledging the alarm, the humidification module tries to fill up and start operating.

Water consumption at 37 °C */ 98.6 °F* and 93 % r.h.:

- Without opening the door: very low.
- When opening the door 10 times a day: approx. 70 ml per day. (if using the freshwater bag with 0.9 l capacity this is approx. 12 days)

4.5.1.2 Dehumidification

To reduce the humidity, ambient air is sucked in through a gas fine filter (sterile filter). As a result, the air in the interior is diluted with the air from outside. The air tube for inlet of the ambient air is located behind the filter in the upper right corner in the recess for the freshwater bag. We recommend replacing the sterile filter on this tube about once a month. To replace the sterile filter, see chap. 22.2.3.

4.5.1.3 Types of suitable water quality

- Water supply via prefilled water bottle (**BINDER-Water-Set** accessory, chap. 4.5.2)
- Deionized water from a water treatment installation already existing at the customer's site. Conductivity from 1 µS /cm up to a maximum of 20 µS/cm. (Water, which is in equilibrium with the CO_2 in the air, and has a conductivity below 1 µS/cm (ultrapure water), may cause acid corrosion due to its low pH). See chap. 18.9.4
- Tap water that has been treated by the optional water treatment system BINDER Pure Aqua Service (disposable system). A reusable measuring equipment to assess the water quality is included (chap. 18.9.4).

☞	BINDER GmbH is NOT responsible for the water quality at the user’s site. Any problems and malfunctions that might arise following use of water of deviating quality is excluded from liability by BINDER GmbH. The warranty becomes void in the event of use of water of deviating quality.

!	***NOTICE*** **Danger of calcification of the humidifying system.** **Damage to the chamber.** ➢ Operate the chamber with deionized (demineralized) water only.

	Water intake temperature NOT below +5 °C / *41 °F* and not exceeding 40 °C / *104 °F*.

4.5.2 Water supply via prefilled water bottle (BINDER-Water-Set accessory)

By using the humidification water set you will achieve unsurpassed contamination safety of your samples in the BINDER CO_2 incubator CBF / CBF-UL.

The pre-filled bottle with 1 l of demineralized sterile water is placed in a recess behind the chamber door.

4.5.2.1 Scope of delivery

Each humidification water set includes all necessary connecting parts:

- **BINDER-Water-Sample-Kit** (sample of one bottle, for 1 week, included in scope of delivery)
- **BINDER-Water-Set** with 10 prefilled one-liter bottles (10 weeks demand) Art.no. 8009-1104

The humidification water set includes:

- 1 resp. 10 one-liter bottles, prefilled with sterile, deionized water (art.no. 1007-0314)
- 1 resp. 10 spike connectors (transfer sets) for sterile liquids (art.no. 6007-0131)
- 1 resp. 3 two-piece tube connectors with 3-5mm nozzles (art.no. 6009-0322)
- 1 resp. 3 pc. 25 cm silicone tube 3/5 mm for the pump (art.no. 6008-0267)
- 1 resp. 3 pc.10 cm silicone tube 3/5 mm to the bottle (art.no. 6008-0326)
- 1 resp. 3 gas fine filters (sterile filter) (art.no. 6014-0012)
- Instructions (art.no. 7001-0385)

Hose specification: inner diameter/outer diameter

4.5.2.2 Installation, connection and change of the prefilled water bottle

Figure 18: Installation of the water supply via prefilled water bottle, assembled

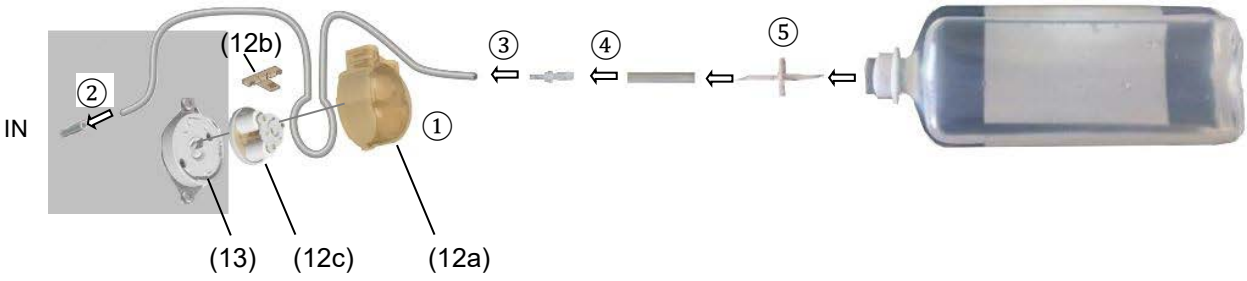


Figure 19: Installation of the water supply via prefilled water bottle

Pump head (12), consisting of
(12a) Pump head cover
(12b) Tube retainer
(12c) Rotor

(13) Pump connector

Please proceed in the following order:

① Turn the pump head (12) counterclockwise until it stops and remove it from the pump connector (13).

Pull up the tongue of the tube retainer (12b) up to “Click” and remove it. Take the rotor (12c) out of the pump head cover (12a)..

Lead the 25 cm silicone tube along the rotor. Insert the rotor with the tube into the pump head cover. Keep the hose tight and do not pinch it..

Press the tube retainer (12b) into the pump head cover until it snaps into place.

Insert the pump head (12) into the pump connector (13) and turn it clockwise until it snaps into place.

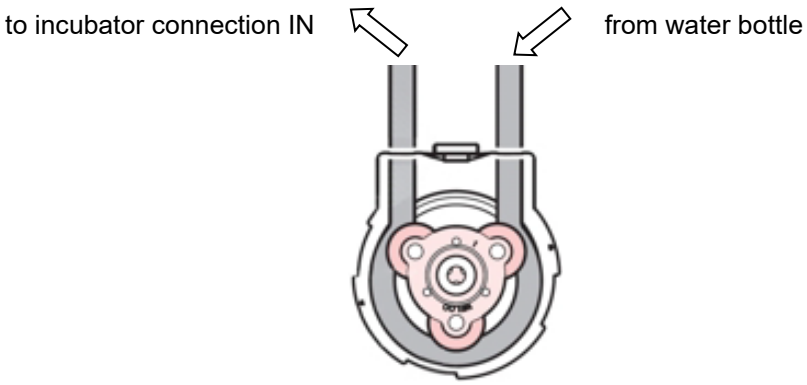


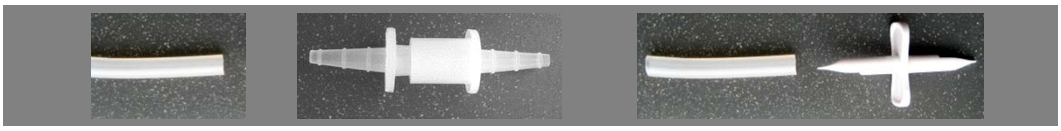
Figure 20: Inserting the silicone tube into the pump head②

② Attach the silicone tube to the incubator connection IN.

③ Plug the part of the tube connector with 3-5mm nozzle in the 25 cm silicon tube and connect both tube connector parts.

④ Connect the free nozzle of the tube connector with a part of the 10 cm silicon tube.

⑤ Remove the protective cap of the spike connector (transfer set), cut off the tip by approx. 2 mm and connect the nozzle of the tube connector with the spike connectors using a part of the 10 cm silicone tube.



25 cm silicone tube to the pump	Two-piece tube connector	10cm silicone tube	Spike connector (transfer set)

Then remove the second protective cap of the spike connector and insert the piercing pin into the water bottle through the silicone seal.

Squeeze the air out of the bottle.

Place the water bottle with the opening to the left in the recess behind the chamber door.

4.5.3 Water supply via freshwater bag (tubular bag set accessory)

The freshwater bag has a volume of 0.9 liters / *0.32 cu.ft.* and is placed behind the chamber door in a recess.

☞	To guarantee humidification during 24 hours at high humidity set-points and / or frequent door openings, we recommend checking the freshwater bag daily at the end of the day.

4.5.3.1 Scope of delivery

Each tubular bag set includes all necessary connecting parts:

- **Set with 3 freshwater bags** (included in scope of delivery) art. no. 8012-2256
- **Set with 12 freshwater bags** (accessory, annual demand) art. no. 8012-2255

Each bag set includes:

- 3 resp. 12 (in the accessory kit) freshwater bags (art.no. 6002-0626)
- 1 resp. 4 two-piece tube connectors with 3-5mm nozzles (art.no. 6009-0322)
- 1 resp. 4 two-piece tube connectors with 5-7mm nozzles (art.no. 6009-0323)
- 3 resp. 12 gas fine filters (sterile filter) (art.no. 6014-0012)
- 3 resp. 12 pc. 25 cm silicone tube (3/5 mm) (art.no. 6008-0320)
- 1 resp. 4 pc. 20 cm filling tube (art.no. 6008-0326)
- Instructions (art.no. 7001-0385)

Hose specification: inner diameter/outer diameter

4.5.3.2 Installation and connection of the freshwater bag (CBF / CBF-UL)

Figure 21: Water supply via freshwater bag, assembled

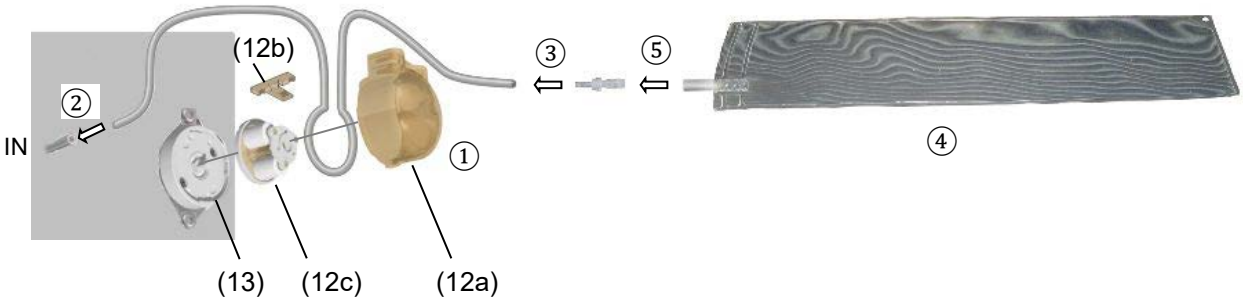


Figure 22: Installation of the water supply via freshwater bag

Pump head (12) consisting of:
(12a) Pump head cover
(12b) Tube retainer
(12c) Rotor

(13) Pump connector

Please proceed in the following order:

① Turn the pump head (12) counterclockwise until it stops and remove it from the pump connector (13).

Pull up the tongue of the tube retainer (12b) up to “Click” and remove it. Take the rotor (12c) out of the pump head cover (12a).

Lead the 25 cm silicone tube along the rotor. Insert the rotor with the tube into the pump head cover. Keep the hose tight and do not pinch it.

Press the tube retainer (12b) into the pump head cover until it snaps into place.

Insert the pump head (12) into the pump connector (13) and turn it clockwise until it snaps into place.

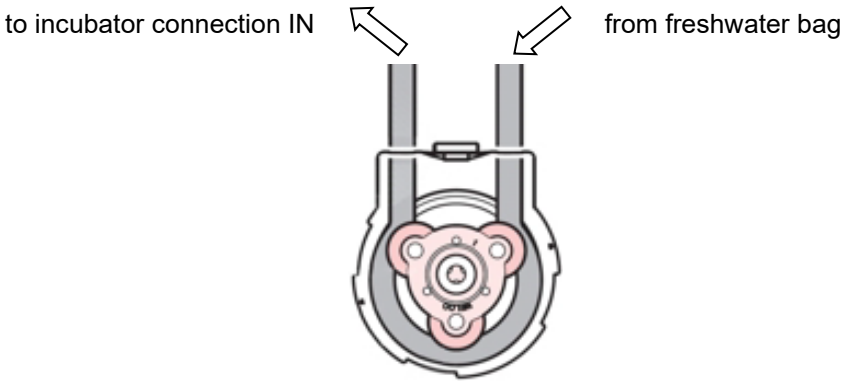


Figure 23: Inserting the silicone tube into the pump head ①

② Attach the silicone tube to the incubator connection IN.

③ Attach the tube connector part with a 3-5 mm nozzle to the 25 cm silicone tube and connect both tube connector parts.

④ Fill the freshwater bag. Observe the water quality (chap. 4.5.1.3)

⑤ Attach the tube connector part with a 5-7 mm nozzle to the freshwater bag.

Place the freshwater bag with the opening to the left in the recess behind the chamber door.

Make sure that the hose between the fresh water bag and the pump head is not kinked.

4.5.3.3 Refilling the already installed freshwater bag

☞	For easier handling, you can temporarily release the pump head from the pump connector on the incubator.

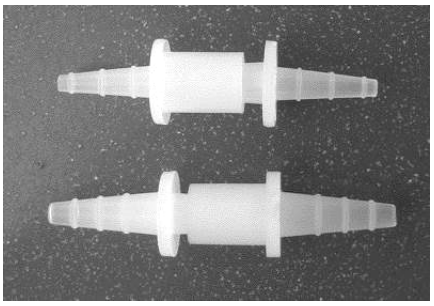
The 20 cm long filling hose included in the set makes filling easier.

- Remove the connection between both parts of the tube connector ③.
- Attach the 20 cm filling tube to the tube connector part which is still on the freshwater bag
- Fill the freshwater bag. Observe the water quality (chap. 4.5.1.3).
- Remove the filling tube from the tube connector on the freshwater bag
- Reassemble the two parts of the tube connector ③.

4.5.3.4 Replacing the tube connectors for freshwater supply

3 two-piece tube connectors with 3-5mm nozzles und 3 two-piece tube connectors with 5-7mm nozzles are included with the bag set accessory.

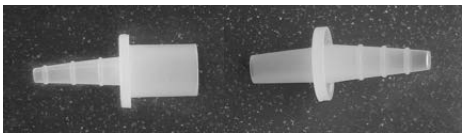
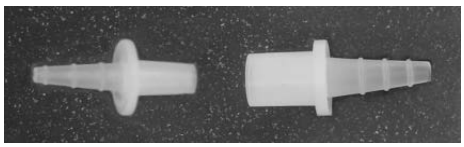
State of delivery:



Two-piece tube connector with 3-5mm nozzles

Two-piece tube connector with 5-7mm nozzles

For connection to the 25 cm silicone tube and the freshwater bag, the hose connectors must be combined accordingly:

	To silicone tube: 3-5 mm nozzle		To freshwater bag: 5-7 mm nozzle
Combination 1:	Opening NW 7 mm		Opening NW 4 mm
Combination 2: (recommended)	Opening NW 4 mm		Opening NW 7 mm

Connecting the freshwater bag

Put the filled freshwater bag on the nozzle of the hose connector.

4.5.4 Water supply via freshwater can (water container set accessory)

The fresh water can, which is placed in an included magnetic can holder on the left chamber side, serves to supply up to 4 chambers with freshwater for humidification.

Since the pump is self-priming, it is not required that the water outlet of the can should be placed higher than the pump, so you can position the water can freely in height.

The freshwater can outlet must NOT be placed on or above the rear panel of the chamber or on the right chamber side.

	DANGER
	Electrical hazard by water entering the chamber via the rear panel. **Deadly electric shock.** ➢ The magnetic support adjustable in height (option) may only be attached on the left side of the chamber. ∅ Do NOT place the freshwater can tap on or above the rear panel of the chamber

Figure 24: Two CBF / CBF-UL incubators with installed water supply via freshwater can (accessory)

4.5.4.1 Scope of delivery

The accessory water container set includes all necessary connecting parts:

- Art. no. 8009-1128 Set with freshwater can, magnetic support and connecting parts

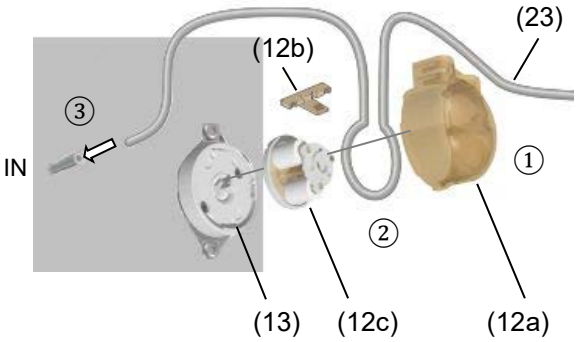
The water container set includes:

- Magnetic can holder adjustable in height, consisting of magnetic holder (art.no. 8022-0009) and water can support (art.no. 4021-0724)
- Water can, 10 l (art.no. 6011-0192)
- Hose coupling with aqua stop (art.no. 6002-0637)
- Angular coupling plug with aqua stop (art.no. 6002-0638)
- 1,2 m PTFE tape (art.no. 1004-0011) for sealing the outlet tap
- 12 gas fine filters (sterile filter) (art.no. 6014-0012)
- 10 m silicone tube 3/5 mm (art.no. 6008-0311) to the pump or via T-type tube connectors to further chambers
- 20 cm silicone tube 8/12 mm (art.no. 6008-0326)
- Reducing connector (tube connector 4/9 mm) (art.no. 6009-0308)
- 3 T-type tube connectors (T-Pieces), 4mm (art.no. 6009-0317)
- Instructions (art.no. 7001-0385)

Hose specification: inner diameter/outer diameter

4.5.4.2 Installation and connection of the freshwater can (water container set accessory)

First, the 10 m silicone hose (23) must be connected to the chamber and led through the pump.



Pump head (12), consisting of:

(12a) Pump head cover

(12b) Tube retainer

(12c) Rotor

(23) 10 m silicone tube

(13) Pump connector

Figure 25: Installation of the water supply at the pump

Please proceed in the following order:

① Turn the pump head (12) counterclockwise until it stops and remove it from the pump connector (13).

Pull up the tongue of the tube retainer (12b) up to “Click” and remove it. Take the rotor (12c) out of the pump head cover (12a).

Lead the 10 m silicon tube along the rotor. The end of the tube for connecting to the incubator inlet IN should be about 6 cm long.

② Insert the rotor with the tube into the pump head cover. Keep the hose tight and do not pinch it. ②

Press the tube retainer (12b) into the pump head cover until it snaps into place.

Insert the pump head (12) into the pump connector (13) and turn it clockwise until it snaps into place.

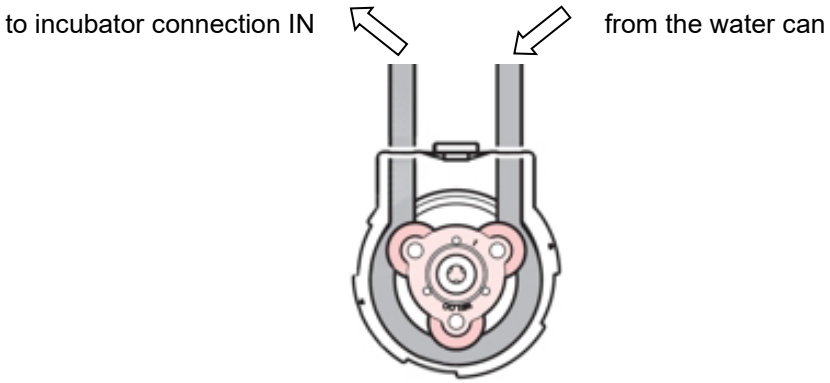


Figure 26: Inserting the silicone tube into the pump head ②

③ Attach the silicone tube to the incubator connection IN.

Now you can attach the freshwater can at the chamber and establish the hose connection to the freshwater can.

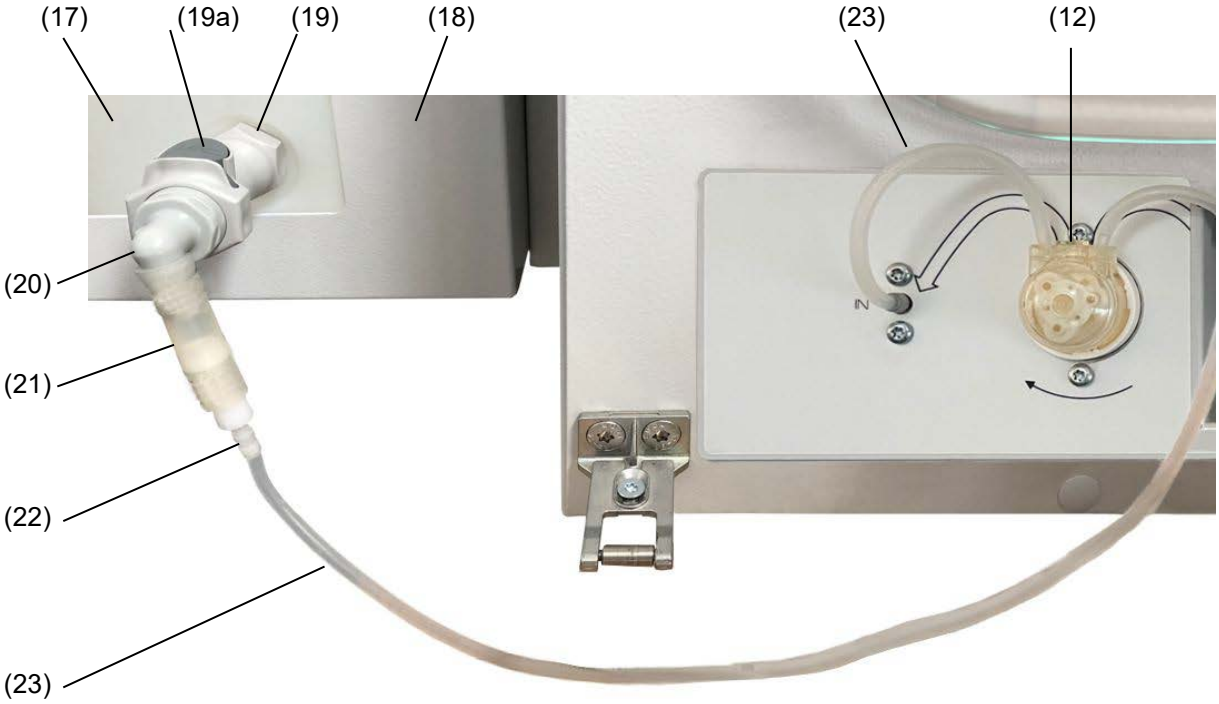


Figure 27: Installation of the water supply via freshwater can, example with single chamber

(17) Freshwater can
(18) Magnetic can holder (water can support)
(19) Hose coupling with aqua stop
(19a) Removal button
(20) Angular coupling plug with aqua stop
(21) Silicone tube d 10
(22) Reducing connector
(23) 10 m silicone tube to the pump (or via T-type tube connector (T-piece) to another chamber)
(12) Pump

Please proceed in the following order:

- Assemble the magnetic can holder (18): Attach the water can support to the holder
- Attach the magnetic can holder (18) to the left chamber side
- Insert the freshwater can (17) from above into the water can support
- Screw the hose coupling with aqua stop (19) on the water can outlet
- Insert the angular coupling plug (20) into the hose coupling. The gray removal button (19a) on the hose coupling snaps into place.
- Attach a 5 cm piece of the silicone tube d10 (21) to the angular coupling plug.
- Insert the reducing connector (22) into the silicone tube (21)

Water supply for a single chamber:

- Plug the 10 m silicone tube (23) coming from the pump (12) on the reducing connector (22)

Water supply for several chambers:

You can branch off the water supply via T-pieces for additional chambers.

- Divide the 10 m silicone tube (23) into pieces of a suitable length. Take into account the height of the magnetic can holder
- Put a piece of the 10 m silicone tube (23) on the reducing connector (22) and connect a T-piece to the free end
- If there are more than two chambers, you can connect another T-piece using a piece of the 10 m silicone tube (23)
- For each chamber, plug the 10 m silicone tube (23) coming from the pump (12) onto the free outlet of the T-piece

Now you can fill the freshwater can. Observe the water quality. Do not firmly close the lid of the freshwater can to allow air to enter the freshwater can. As a result, obstruction of the water supply due to negative pressure inside the can is avoided.

4.5.4.3 Refilling the freshwater can

For refilling later, you can remove the freshwater can from the water can support. Press the grey removal button on the hose coupling, then the angle coupling plug can be removed. A small amount of water can escape (filling amount of the angular coupling plug). The water can outlet remains closed due to the aqua stop.

Alternatively, you can remove the lid and fill the can on site with a suitable aid (water hose, watering can). When filling on site, the existing hose connection can remain on the freshwater can.

4.6 Electrical connection

The chambers are supplied ready for connection. They come with an IEC connector plug.

Model	Power plug	Voltage +/-10 %	Power frequency	Chamber fuse
CB 56	Grounded plug IEC 7/7	200-230 V (1N~)	50/60 Hz	10 A
CB 56-UL	NEMA 5-20P	100-120 V (1N~)	50/60 Hz	12.5 A
CB 170 CBF 170	Grounded plug IEC 7/7	200-230 V (1N~)	50/60 Hz	10 A
CB 170-UL CBF 170-UL	NEMA 5-20P	100-120 V (1N~)	50/60 Hz	16 A
CB 260 CBF 260	Grounded plug IEC 7/7	200-230 V (1N~)	50/60 Hz	10 A
CB 260-UL CBF 260-UL	NEMA 5-20P	100-120 V (1N~)	50/60 Hz	16 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.

- Use only the original connection cables from BINDER according to the above specification.

  UL chambers: Use only a UL Listed Power supply cord (UL category ELBZ), SJT 3x14 AWG (2.08 mm²). 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 (left chamber side, bottom right-hand, see 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 the chamber, please observe the regulations specified by the local electricity supply company as well as the local and national regulations (VDE directives for Germany).
- Make sure that there is sufficient current protection in accordance with the number of devices that are to be operated. 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. 24.4).

	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.

4.7 Divided inner door with cell therapy compartmentation (optional)

With this option, the chambers are equipped with a divided inner door and additional dividers for compartmentation to prevent mixing up of sample vessels.

Figure 28: A look inside an incubator
with the ”Divided inner door with cell therapy compartmentation” option

4.7.1 Special model CBF 260 “Cell Therapy”

As model variant CBF 260 “Cell Therapy” the chamber is equipped with O_2 control in the range of 0.2–20 Vol.-% and the divided inner door with cell therapy compartmentation.

Variant no.: 9640-0025 (230V) and 9640-0026 (120V)

Figure 29: CBF 260 “Cell Therapy”

4.7.2 Handling and aligning the divided inner door

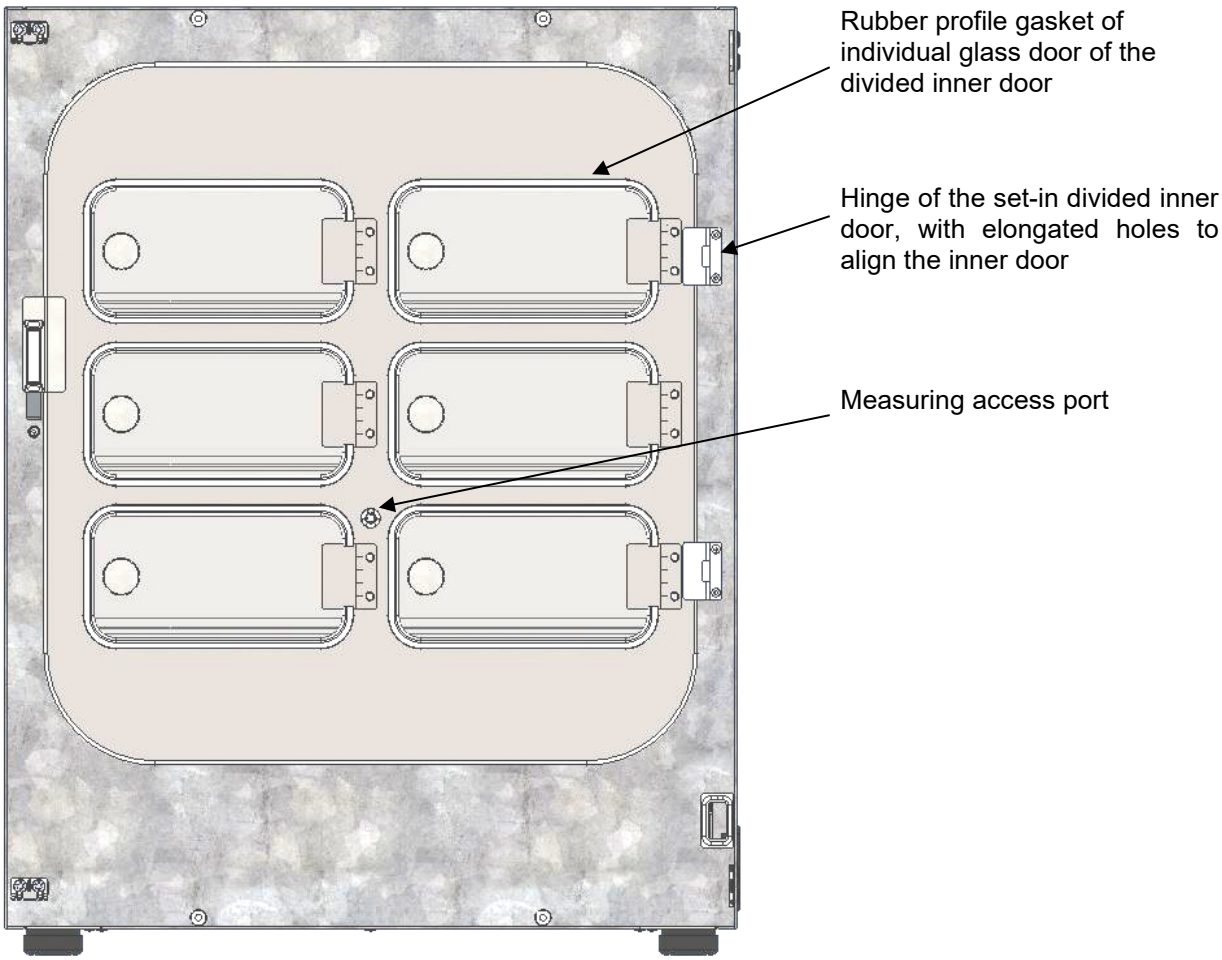


Figure 30: Divided inner door (example: CB 170)

- Pull the handles to open each of the individual glass doors. Do not press too hard while closing them to avoid pushing the doors through the gasket into the inner chamber.
- If the divided inner door is not in an aligned position, fasten the hinge screws in the elongated holes of the hinge to align it. Align the door and operate the locking smoothly.

The divided inner door comes with heat-resistant, self-adhesive numbers for labeling the individual glass doors. You can apply them in the desired arrangement.

The handles of the individual glass doors are best suited for this (see illustration), but the numbers can also be glued directly onto the glass pane.

4.7.3 Mounting the partition walls for cell therapy compartmentation

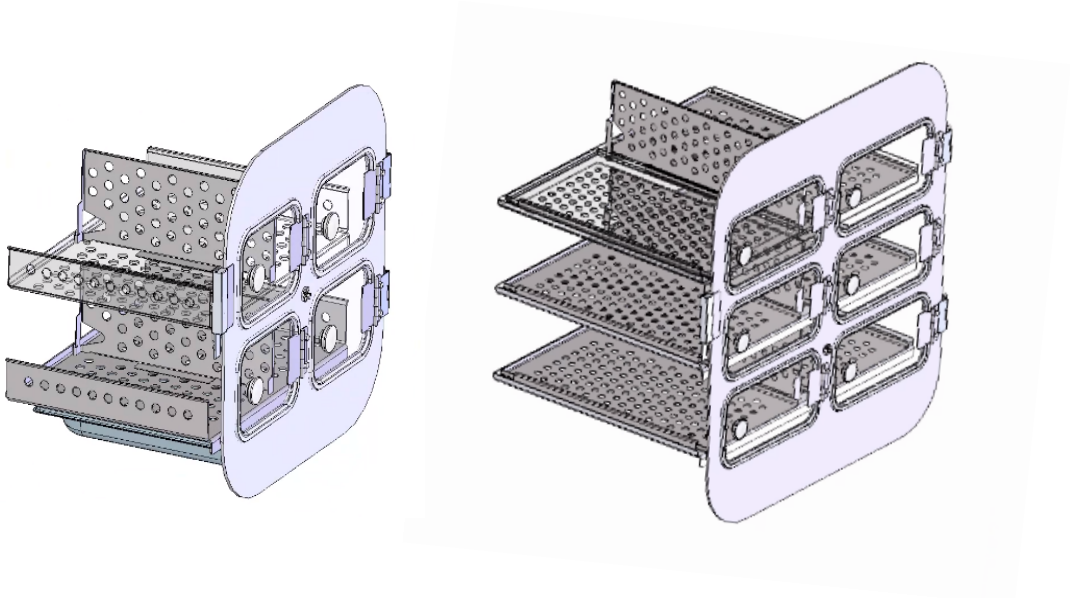
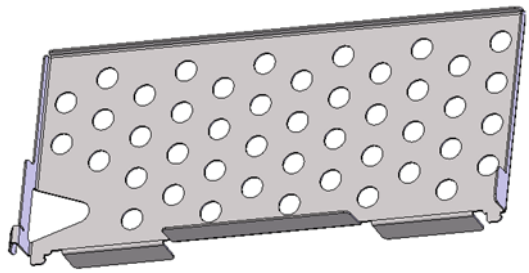


Figure 31: Divided inner door with shelves and partition walls (example, chamber sizes 56 and 170)

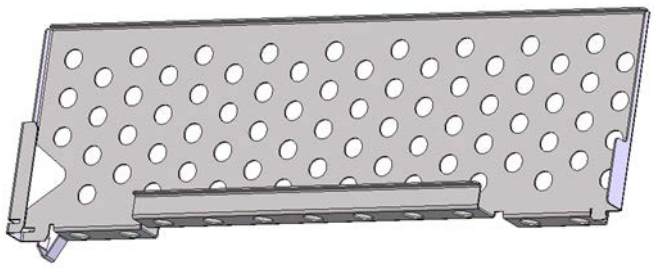
The vertical partition wall is used to compartmentalize the interior of the chamber in connection with the divided inner door. This spatially separates the samples.

The partition wall can be assembled or dismantled without tools and has a secure, vertical position. It can also be used for chambers with the “Divided inner door” option.



Rear Front

Figure 32: Partition wall size 56



Rear Front

Figure 33: Partition wall size 170 / 260

For assembly, insert the lower rear end of the partition wall from above into the gap between the shelves so that the rear end hooks onto the rear of the shelf holder.

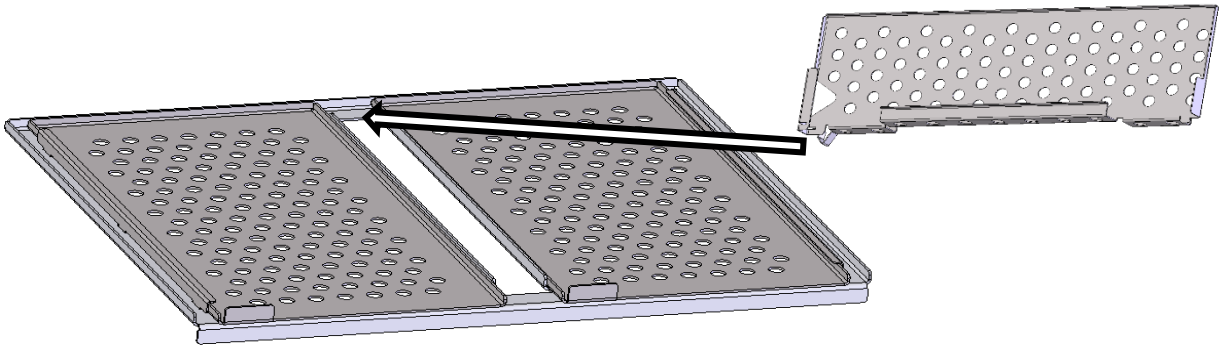
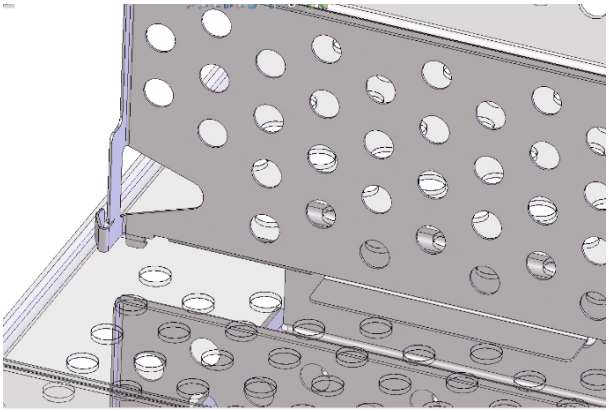


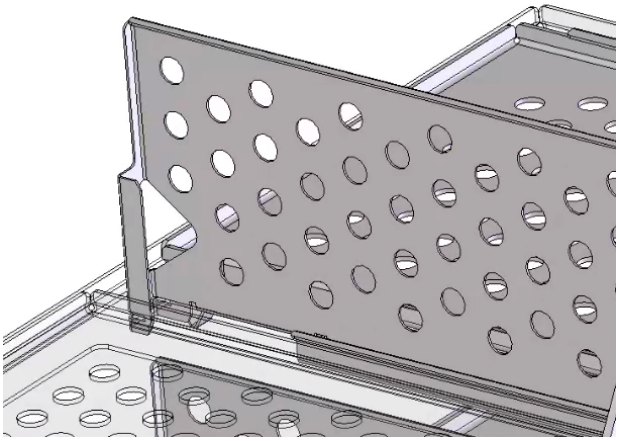
Figure 34: Inserting the partition wall

Then slide the partition towards the back of the chamber until it clicks into place.



Rear

Figure 35: Partition wall, size 56, assembled



Rear

Figure 36: Partition wall, size 170 / 260, assembled

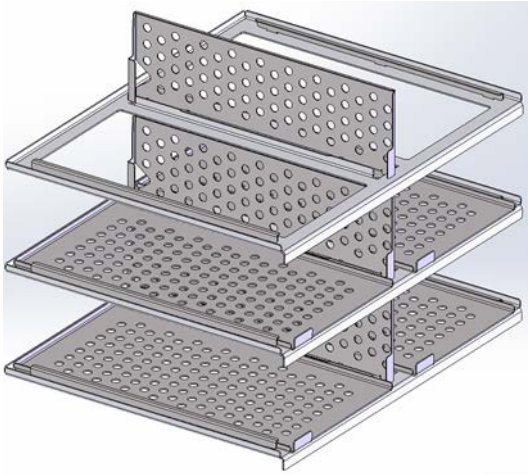


Figure 37: Shelf holder with inserted partition walls (example, size 170)

5. Functional overview of the MB2 chamber controller

The MB2 chamber controller controls following parameters inside the chamber:

- Temperature in °C
- Carbon dioxide concentration in vol.-%
- Oxygen concentration in vol.-% (chamber with O_2 control)
- Humidity in % r.h. (CBF / CBF-UL)

	Note: In this manual the chambers are described in the maximum equipment variant and including the available options. Therefore, some of the pictured and described features are not available on every chambers

You can enter the desired set point values in fixed value operation mode directly on the display surface or via the setpoint menu. For program operation the controller offers programming week and time programs. In addition there is a timer program available (stopwatch function).

The controller offers various notifications and alarm messages with visual and audible indication and remote alarms via e-mail, an event list (trace file) and the graphical display of the measuring values in the in der chart recorder view. The MB2 program controller permits programming temperature and CO_2 / O_2 and humidity cycles (CBF / CBF-UL), and specifying special controller functions for each program section. You can enter values or programs directly at the controller or use the APT-COM™ 4 Multi Management Software (accessory) specially developed by BINDER.

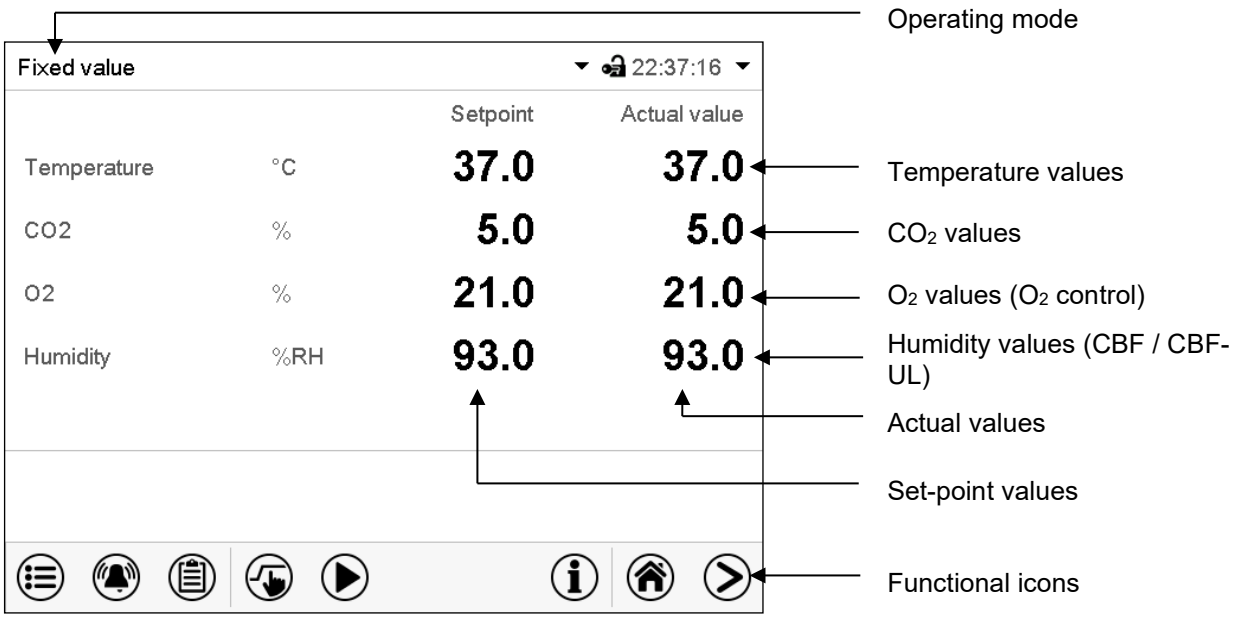


Figure 38: Normal display of the MB2 program controller (sample values, CBF / CBF-UL with O_2 control)

5.1 Operating functions in normal display

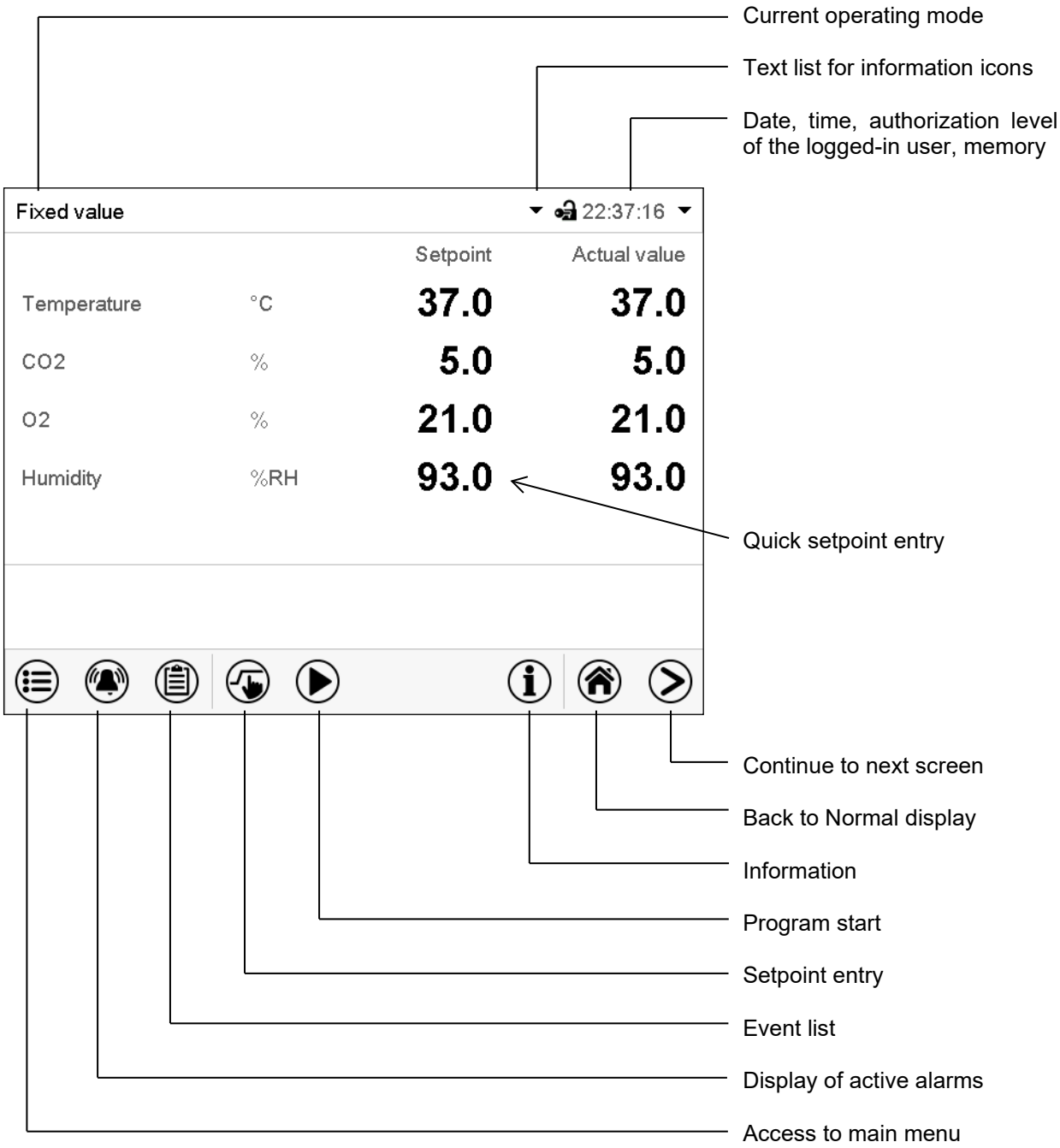
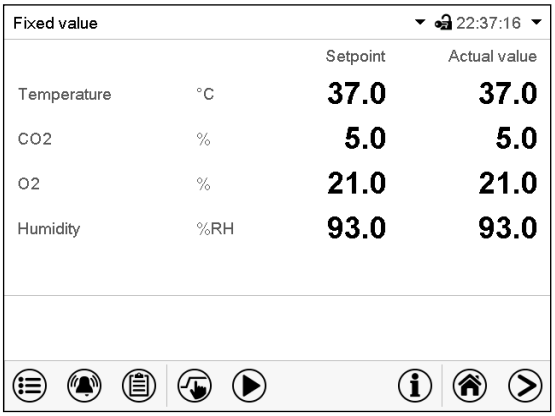


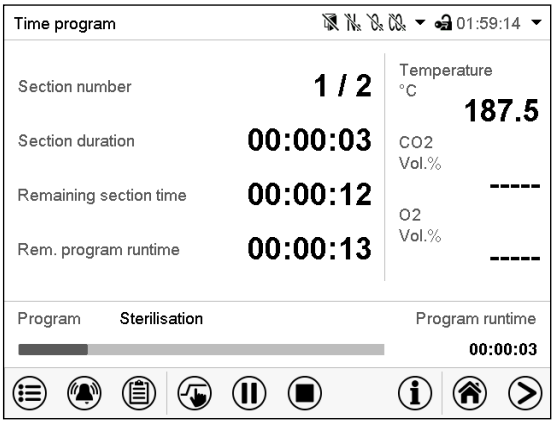
Figure 39: Operating functions of the MB2 controller in normal display (sample values, CBF / CBF-UL with O_2 control)

5.2 Display views: Normal display, program display, chart-recorder display

	Press the ***Change view*** icon to toggle between normal display, program display and chart-recorder display.
	Press the ***Normal display*** icon to return from program display and chart recorder display back to Normal display.



Normal display (actual values / setpoint values)



Program display (example: time program)

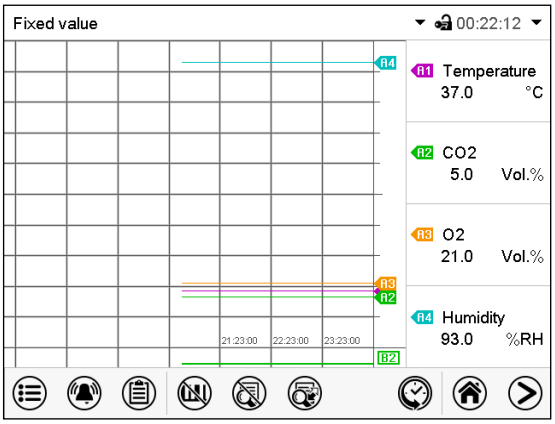


Chart recorder display

(Sample values, CBF / CBF-UL with O_2 control)

5.3 Controller icons overview

Navigation icons in Normal display

Icon	Signification	Function
	Main menu	Access from Normal display to the main menu
	Alarm	Access from Normal display to the list of active alarms
	Event list	Access from Normal display to the event list
	Setpoint setting	Access from Normal display to the setpoint entry menu: setpoint entry for Fixed value operation, turning on/off CO_2 / O_2 and humidity control (CBF / CBF-UL), safety controller settings
	Program start	Start a previously entered time or week program, continue a paused time program
	Program pause	Pause a running time program
	Program cancelling	Cancel a running time or week program
	Information	Information on program operation, setpoints, actual values, and the safety controller
	Normal display	Return from program display or chart recorder display to Normal display
	Change view	Toggle between Normal display, program display, and chart recorder display

Functional icons in individual menus

Icon	Signification	Function
	Back	Return from each menu to Normal display
	Update	Update the event list and alarm messages
	Confirm	Take over the entries and exit the menu / continue menu sequence.
	Close	Exit the menu / cancel menu sequence. Entries are not taken over. When terminating a menu sequence, an information window appears, which must be confirmed.
	Reset alarm	Acknowledge the alarm and mute the buzzer.
	Change keyboard	Change between uppercase and lower case characters, digits and special characters
	Edit	Edit settings of time and week programs

Functional icons in the chart recorder display

Icon	Signification	Function
	Show legend	Show legend
	Hide legend	Hide legend
	Switch legend	Switch between legend pages
	Show indications	Show indication “Door open” (B2)
	Hide indications	Hide indication “Door open” (B2)
	History display	Pause chart recorder and change to history display. Data recording continues.
	Curve selection	Go to “Curve selection” submenu in the history display
	Search	Go to “Search” submenu in the history display to select the required instant
	Zoom	Go to “Zoom” submenu in the history display to select the zoom factor
	Show scroll buttons	Show scroll buttons in the history display to scroll to an instant
	Hide scroll buttons	Hide scroll buttons in the history display to scroll to an instant

Information icons referring to chamber conditions

Icon	Text information	Condition
	“Idle mode”	Controller is in Idle mode
	“Door open”	Chamber door is open
	“CO2 pressure alarm off”	CO_2 pressure alarm deactivated
	“O2 pressure alarm off”	O_2 pressure alarm deactivated (chamber with O_2 control)
	“N2 pressure alarm off”	N_2 pressure alarm deactivated (chamber with O_2 control)
	“Interior socket”	Interior socket (option) activated

Information icon for data processing

Icon	Information
	Waiting icon: Data processing is running. Remaining time to touch the display when calibrating the touchscreen.

5.4 Operating modes

The MB2 program controller operates in the following operating modes:

- **Idle mode**

  The controller is not functional, i.e., there is no heating, no CO_2 inlet or O_2 inlet (O_2 control) and no humidification (CBF / CBF-UL). The chamber approximates ambient values.

  You can activate and deactivate this operating mode with the “Idle mode” controller function in Fixed value operating mode (chap. 7.3), time program operation (chap. 9.7.3) and week program operation (chap. 10.6.5).

- **Fixed value operating mode**

  The controller operates as a fixed-point controller, i.e., set-points for temperature, CO_2, O_2 (O_2 control) and humidity (CBF / CBF-UL) can be defined, which are then maintained until the next manual change (chap. 7.1).

- **Timer program operation**

  Stopwatch function: during an entered duration the controller constantly equilibrates to the setpoints entered in Fixed value operation mode.

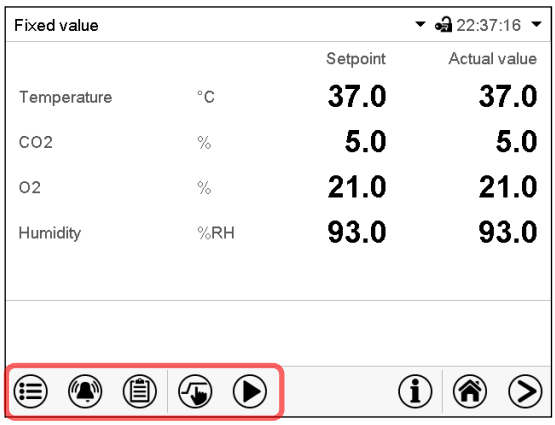
- **Time program operation**

  An entered time program for temperature, CO_2, O_2 (O_2 control) and humidity (CBF / CBF-UL) is running. The controller offers 25 program memory places with 100 program sections each. The total number of program sections of all programs is unlimited

- **Week program operation**

  An entered week program for temperature, CO_2, O_2 (O_2 control) and humidity (CBF / CBF-UL) is running. The controller offers 5 program memory places with 100 switching points each. The switching points can be distributed over all days of the week.

5.5 Controller menu structure



Use the **navigation icons** in the screen footer in Normal display to access the desired controller functions.

The available functions depend on the current **authorization level** “Service”, “Admin” or “User” (chap. 13.1). This is selected either during login or can be available without password protection.

	Main menu: program settings, further information, “Service” submenu. The “Settings” submenu allows general configuration of the controller.	chap. 5.5.1
	List of **active alarms**	chap. 11
	Access to the **event list**	chap. 15.3

	Setpoint entry for Fixed value operation, turning on/off **CO_2 control, O_2 control** (chamber with O_2 control) and **humidity control** (CBF / CBF-UL); **safety controller** settings	chap. 7, 6.7, 12.2
	Start/ pause/ cancel an already entered, respectively a running **time program** or start / cancel an already entered, respectively a running **week program**	chap. 9.1, 9.2, 10.1

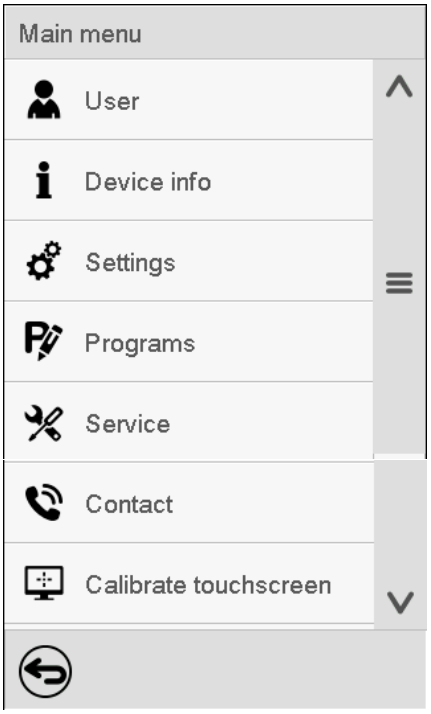
Unless noted otherwise, the figures show the functional range, which is available for the user with “Admin” authorization level.

5.5.1 Main menu

The main menu provides access to the general configuration of the controller as well as to program entry and the user administration. Additionally there are support functions like a contact page or the display calibration depending on the available angle.

	Press the ***Main menu*** icon to access the main menu from Normal Display.
	Press the ***Back*** icon to return from each setting menu to Normal Display.

The main menu provides the following functions and submenus.



User management: login and logout, password management	chap. 13
Chamber information	chap. 15.2
“Settings” submenu (not visible for user with “User” authorization level)	chap. 14
Program entry submenu for time and week programs	chap. 9 and 10
“Service” submenu	chap. 5.5.3
BINDER Service contact page	chap. 15.1
Calibrating the touch screen	chap. 14.4.2
Back to Normal Display	

“Settings” submenu

- Settings of many general controller functions and network settings (chap. 14).
- Available only for users with “Service” and “Admin” authorization level

“Service” submenu

- Access to service data, controller reset to factory settings (chap. 5.5.3)
- Available only for users with “Service” and “Admin” authorization level. Full functional range only for BINDER Service (users with “Service” authorization level).

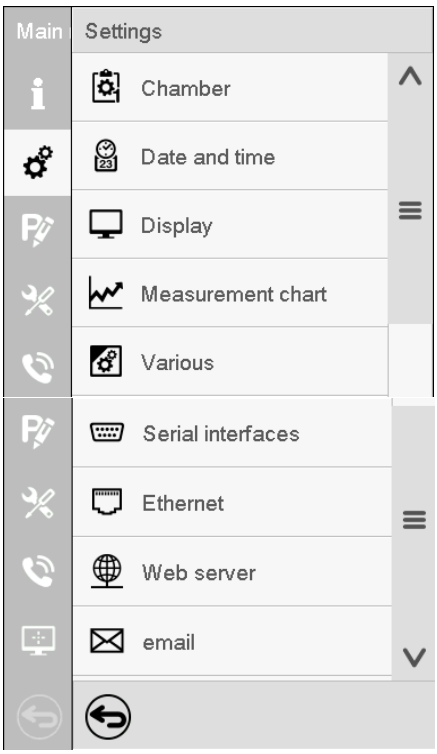
“Programs” submenu

- Access to the controller’s program functions (chap. 8, 9, 10)

5.5.2 “Settings” submenu

The “Settings” submenu 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.

Path: ***Main menu > Settings***

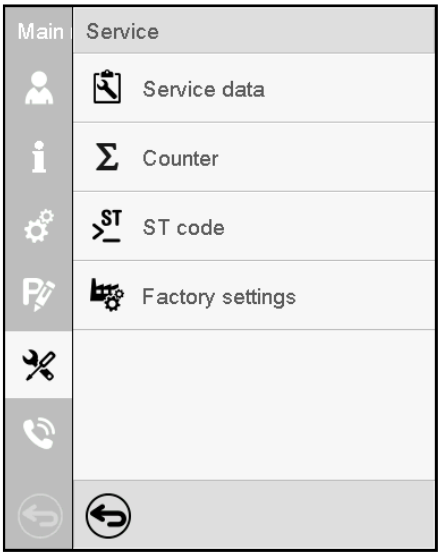


Setting the temperature unit, menu language…	chap. 14.1, 14.2
Setting date and time	chap. 14.2
Setting the display brightness, continuous operation and screen saver	chap. 14.4
Settings for the measurement chart: storage interval, storage values, minimum and maximum values	chap. 16.2
Setting the tolerance range and delay time for tolerance range alarm	chap. 11.4
Configuration of the RS485 interface (available via BINDER INDIVIDUAL Customized Solutions)	chap. 14.5.1
Entry of the MAC address and IP address	chap. 14.5.2
No function	
Configuration of the e-mail server, assignment of e-mail addresses	chap. 14.5.33
Back to main menu	

5.5.3 “Service” submenu

The “Service” submenu is available for users with “Service” or “Admin” authorization level. When logged-in with “Admin” authorization level the user will find information to tell the BINDER Service in service case.

Path: ***Main menu > Service***

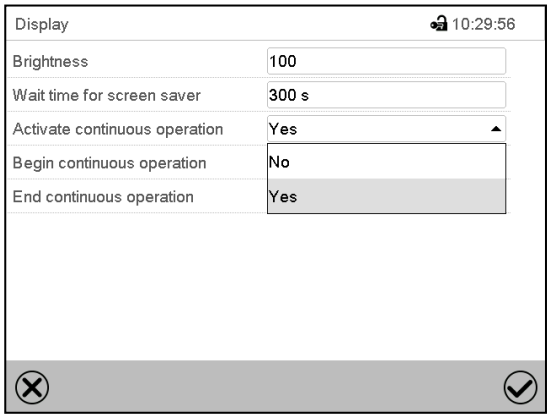


Serial number of the chamber, setup version of the controller software	chap. 14.2
No function	
Information for BINDER Service	
Reset to factory settings	
Back to main menu	

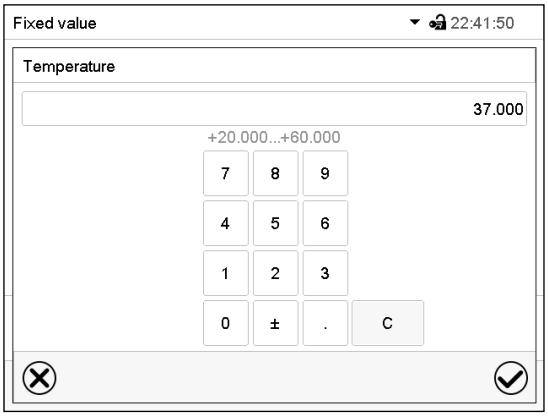
(view with “Admin” authorization level)

5.6 Principle of controller entries

In the selection and entry menus there are icons displayed in the footers which you can use to take over the entry or cancel it.



Selection menu (example)



Entry menu (example CB (E7)).

After completing the settings there are the following possibilities:

✓	Press the ***Confirm*** icon to take over the entries and exit the menu or continue the menu sequence.
✕	Press the ***Close*** icon to exit the menu or cancel the menu sequence without taking over the entries. When terminating a menu sequence, an information window appears, which must be confirmed.

5.7 Performance during and after power failures

During a power failure, all controller functions are shut down. The gas inlet valves are closed so that no gas can escape into the ambient air. The zero-voltage relay alarm output (3) (chap. 11.6) is switched to alarm position for the whole duration of the power failure.

After the power returns, all functions return to the same status the chamber had before power failure. . The controller continues to function in the original operating mode it was in previously before the power failure occurred.

- Performance after power failure in Idle mode

  Control is deactivated

- Performance after power failure in Fixed value operation mode

  All functions return to the same status the chamber had before power failure. The set-points are immediately resumed.

- Performance after power failure during time program operation

  The program is resumed at the point where the interruption occurred with the latest set-points reached during the program run.

- Performance after power failure during week program operation

  The week program continues with the values corresponding to the current time.

- Performance after power failure during sterilization operation

  The sterilization process is cancelled and the controller changes to Fixed value operation mode with the setpoints already entered. All setpoint values remain in memory.

Power failure and power return are noted in the event list (chap. 15.3).

If during power failure the inner chamber temperature or the CO_2 / O_2 concentration (chamber with O_2 control) or humidity (CBF / CBF-UL) has fallen below the alarm thresholds, confirm the alarms (e.g., tolerance range, safety controller). See chap. 11.3.

5.8 Performance when opening the door

When you open the door, CO_2 control and O_2 control (chamber with O_2 control) immediately turns off.

After 60 seconds from opening the door, the heating and humidification (CBF / CBF-UL) turn off.

After closing the door, heating, CO_2 control, O_2 control (chamber with O_2 control), humidification (CBF / CBF-UL) turn on again.

6. Start up

6.1 Turning on the chamber

After connecting the supply lines (chap. 4), turn on the chamber by its main power switch. The lit pilot lamp shows the chamber is ready for operation.

When the main power switch is turned on and yet the controller display is dark, the display is in stand-by mode. Press on the touchscreen to activate it.

Check that the CO_2 control is activated (chap. 6.7).

CBF / CBF-UL: Fill the freshwater bag (chap. 4.5). Check that the humidifying system is activated (chap. 6.7).

After the first turning on of the chamber or after an interruption of the power supply the relative humidity will increase after a delay of about 20 minutes. During this period, the relative humidity can drop considerably.

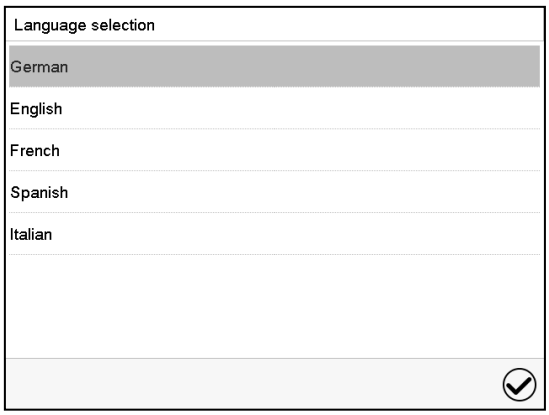
Chamber with O_2 control: Check that the O_2 control is activated (chap. 6.7).

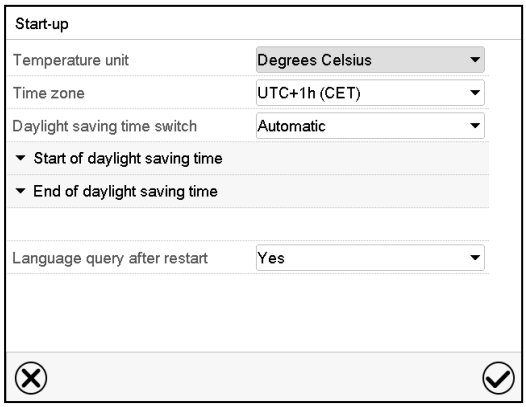
Warming chambers may release odors in the first few days after commissioning. This is not a quality defect. To reduce odors quickly we recommend heating up the chamber to its nominal temperature for one day and in a well-ventilated location.

	WARNING: If customer should use a BINDER 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.

6.2 Controller settings upon start up

The window „Language selection“ enables the **language selection**, in case that it’s activated in the “Start-up” menu. Afterwards occurs a request of the **time zone** and the **temperature unit**.

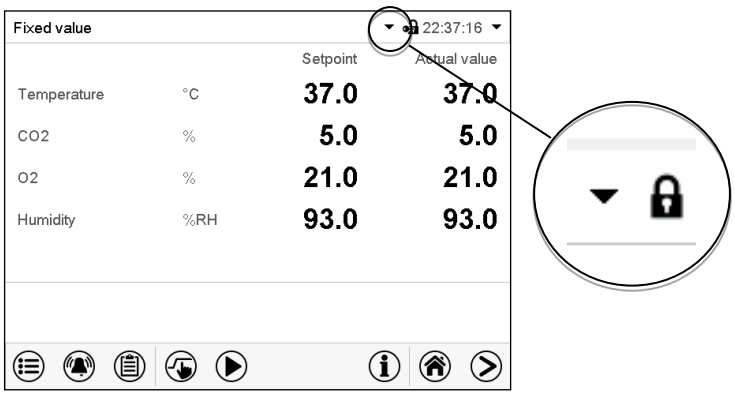




The controller will function in the **operating mode**, which was active before the last shut-down. It controls temperature, CO_2, O_2 (chamber with O_2 control) and humidity (CBF / CBF-UL) in fixed value operating mode to the last entered values and in the program mode to the set points achieved beforehand.

Locked operation

Provided that the user administration has been activated by the assignment of passwords for the different authorization types, the **controller operation** is first locked after turning on the unit, recognizable by the closed lock icon in the header.



In the locked view the controller provides all display functions. No setting functions are available.

The setpoints are shaded (light grey) in normal display. Changing them by direct entry in the fixed value operating mode is not possible. The functional icons for setpoint entry and program start in the footer are without function.

After turning on the unit, user log-in is required to operate the controller (chap. 13.2)

Operation without user log-in / without password-protection

If the password function has been deactivated, after turning on the unit without user log-in there are those controller functions available, which correspond to the highest authorization level without a password protection. There is no lock icon in the header.

6.3 Factory settings

The chamber is supplied with the following basic preset parameters:

- Temperature setpoint — 37 °C / *98.6 °F*
- CO_2 setpoint — 5 vol.-%
- O_2 setpoint (chamber with O_2 control) — 21 vol.-%
- Humidity setpoint (CBF / CBF-UL) — 93 % r.h.
- Safety controller class 3.1 — Offset 2 °C
- Sterilization temperature (set-point) — 180 °C / *356 °F*
- Audible alarm signal (buzzer) — activated

The set temperature determines the target working temperature in the inner chamber, i.e. set value 37 °C / *98.6°F* = target working temperature 37 °C / *98.6°F*. The same is valid for the CO_2 and O_2 concentration (chamber with O_2 control) and humidity (CBF / CBF-UL). For the hot-air sterilization, the set value is 180 °C / *356 °F* and cannot be changed.

☞	As long as there is a difference between the actual and set value shown in the display, adequate operation of the chamber is not guaranteed.

6.4 Equilibration time

Temperature

- Equilibration time is max. 4 hours.

CO_2

- After turning in the chamber, after approx. 5 minutes the CO_2 concentration equilibrates automatically to the pre-set value of 5 vol.-% CO_2.
- Equilibration time is max. 0.5 hours.

O_2 (chamber with O_2 control)

- After turning in the chamber, the ambient oxygen concentration of approx. 20.9 vol.-% is displayed after a delay of 10 minutes. During the first 10 minutes, O_2 control is not defined. Then O_2 is regulated to the displayed setpoint value of 21 vol.-%.
- For high O_2 setpoint values (with alternative control range option), equilibration time is max. 1.5 hours.

Humidity (CB / CB-UL)

- With humidity control effected via the Permadry® system equilibration time is max. 15 hours

Humidity (CBF / CBF-UL)

- Equilibration time is max. 1 hour.

6.5 Operating the DuoDoor™ door lock

WARNING

Magnets can affect the function of pacemakers and implanted defibrillators.

A pacemaker can be put into test mode and cause discomfort. A defibrillator may not work anymore.

- ➢ If you wear such devices, maintain a sufficient safety distance to the chamber door in the area of the door handle.
- ➢ Warn wearers of such devices of approaching the chamber door.

The DuoDoor™ door lock offers two different ways to open the doors, dependent on the glass door lock position.

Opening outer door and glass door independently

When closing the glass door, close the glass door lock.

Then you can close and open the outer door using its handle. The glass door will remain closed until you manually open the glass door lock.

Figure 40: Closed position

Opening outer door and glass together

When closing the glass door leave the glass door lock in open position. Then close the outer door. The glass door is pressed against the gasket so that both doors are securely closed.

When opening the outer door, a magnetic device also opens the glass door.

Figure 41: Open position

6.6 Required gas supply for the chamber with O_2 control

In the chamber with O_2 control, cell growth can be additionally influenced by a variable oxygen content. Depending on the required range of O_2 concentration, the type of gas which is required may vary. To this end, two equipment variants are available:

6.6.1 Hypoxic control range 0.2 vol.-% up to 20 vol.- % O_2 (regular)

In addition to the CO_2 connection, the chamber provides a gas connection for N_2.

As compared to the ambient air (O_2 concentration of 20.9 vol.-%) only the N_2 concentration needs to be increased, no oxygen is required for the O_2 control. Therefore, it is not necessary and possible to connect an O_2 cylinder. Even with activated O_2 control no O_2 pressure alarm will be emitted.

6.6.2 Alternative control range 10 vol.-% up to 90 vol.-% (option)

In addition to the CO_2 connection, the chamber provides gas connections for O_2 and N_2.

- **Operation in the hyperoxic range (> 22 vol.-% O_2)**

  As compared to the ambient air (O_2 concentration of 20.9 vol.-%) only the O_2 concentration needs to be increased, no nitrogen is required for the O_2 control. Therefore, it is not necessary to connect a N_2 cylinder.

  You can deactivate the N_2 pressure alarm in the controller (chap. 7.3). Then also with activated O_2 control no N_2 pressure alarm will be emitted.

- **Alternating operation in the hyperoxic *and* hypoxic range or in the range from 20 vol.-% O_2 up to 22 vol.-% O_2**

  N_2 and O_2 are required for O_2 control. It is necessary to connect all gas supplies.

  You can deactivate the O_2 and / or N_2 pressure alarm in the controller (chap. 7.3). Then also with activated O_2 control no O_2 and / or N_2 pressure alarm will be emitted.

6.6.3 Operation without O_2 control

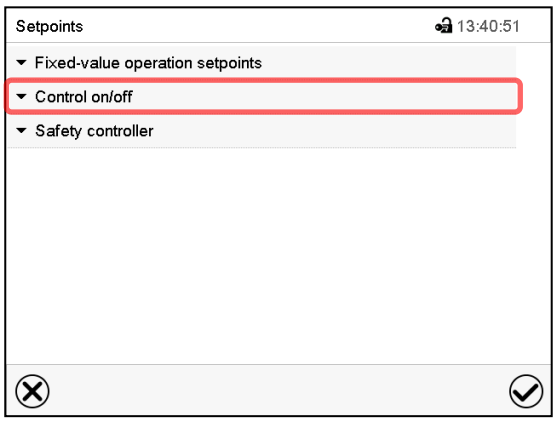
You can deactivate the O_2 control in the controller (chap. 6.7). With this setting, no O_2 and N_2 pressure alarms and no O_2 tolerance range alarm will be issued. The zero-voltage relay alarm contact (chap. 11.6) will also not be triggered.

Since neither nitrogen nor oxygen are required, it is not necessary to connect an O_2 or N_2 cylinder.

6.7 Activating / deactivating CO_2, O_2 and humidity control

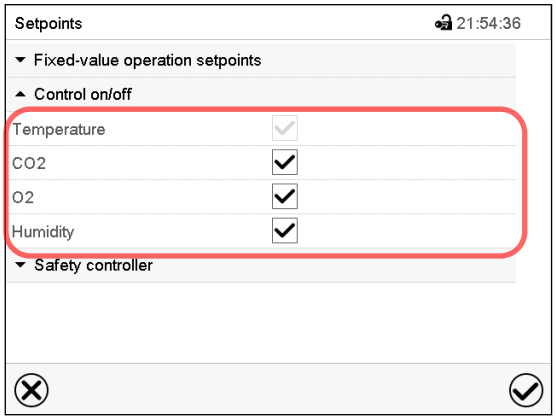
If CO_2 control and/or O_2 control (chamber with O_2 control) and/or humidity control (CBF / CBF-UL) shall not be used, it is possible to deactivate them in the controller.

	Press the ***Setpoint setting*** icon to access the “Setpoint” setting menu from Normal display.



“Setpoints” menu.

Select “Control on/off”.



You can turn on or off CO_2 control and O_2 control (chamber with O_2 control) and humidity control (CBF / CBF-UL)

Mark / unmark the checkbox to activate / deactivate the desired function and press the ***Confirm*** icon.

	When operating the chamber with deactivated CO_2 control, no CO_2 pressure alarm and no CO_2 tolerance range alarm will be emitted.

	Chamber with O_2 control: When operating the chamber with deactivated O_2 control, no O_2 and N_2 pressure alarms and no O_2 tolerance range alarm will be emitted.

	CBF / CBF-UL: When operating the chamber with deactivated humidity control no humidity tolerance range alarm will be emitted. The controller continues to show the actual humidity value but no longer the humidity set-point.

6.8 CB / CB-UL: Humidity control of the Permadry™ system

	With the CBF / CBF-UL, humidity setting via the Permadry™ System is not used.

The Permadry™ system with its 2-pan water system guarantees a maximum humidity of up to 95 % r.H. in the inner chamber, which remains condensation-free. This performance assumes an average ambient temperature of 22 +/- 3 °C / *71.6 +/- 5.4 °F* and a working temperature in the inner chamber of 37 °C / *98.6 °F*.

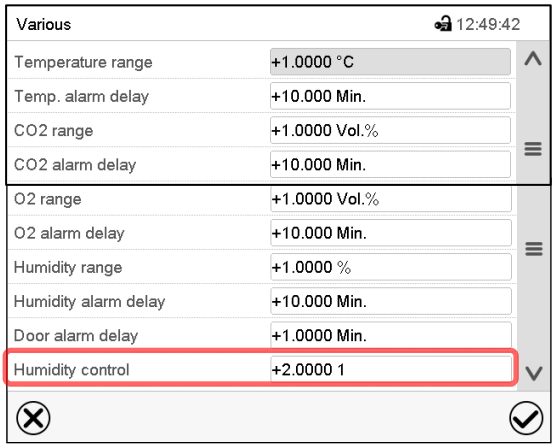
You can increase or decrease humidity slightly via the heating of the water pan if required.

Humidity is infinitely adjustable in whole numbers from -5 (low) to +5 (high).

Factory setting: “0” (medium).

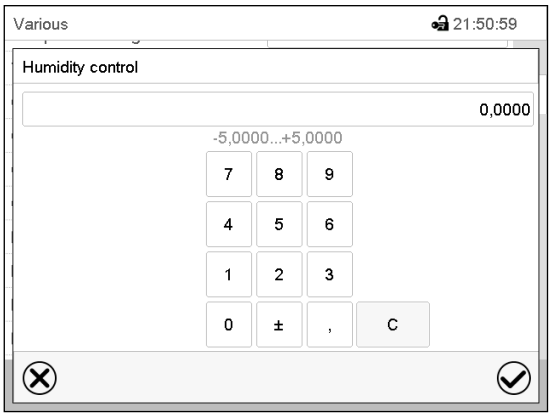
Setting:

Path: ***Main menu > Settings > Various***



Submenu “Various”.

Select the field “Humidity control”



“Humidity control” entry menu. Enter the desired humidity and confirm entry with ***Confirm*** icon.

	If the ambient temperature deviates by more than +/- 5 °C from the values recommended by the manufacturer, the conditions for maximum air humidity with condensation-free inner chamber are no longer guaranteed. Contact BINDER Service for assistance.

7. Set-point entry in “Fixed value” operating mode

In Fixed value operating mode you can enter set-points for temperature, CO_2 and O_2 (chamber with O_2 control) and humidity (CBF / CBF-UL), and the switching-state of up to 16 special controller functions.

All settings made in Fixed value operating mode remain valid until the next manual change. They are saved also when turning off the chamber or in case of toggling to Idle Mode or Program Mode.

	Setting ranges	**Control ranges**
Temperature	20 °C / *68 °F* up to *CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*	4 °C / *7.2 °F* above ambient temperature up to *CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*
Temperature (chamber with O_2 control)	20 °C / *68 °F* up to *CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*	6 °C / *10.8 °F* above ambient temperature up to *CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*
CO_2	0 vol.-% up to 20 vol.- %	0 vol.-% up to 20 vol.- %
O_2 (chamber with O_2 control, with regular hypoxic control range)	0.2 vol.-% up to 21 vol.- %	0.2 vol.-% up to 20 vol.- %
O_2 (chamber with O_2 control, with optional alternative control range)	5 vol.-% up to 90 vol.-%	10 vol.-% up to 90 vol.-%
Humidity (CBF / CBF-UL)	50 % r.h. up to 95 % r.h.	50 % r.h. up to 95 % r.h. (condensation-free up to 90 % r.h.)

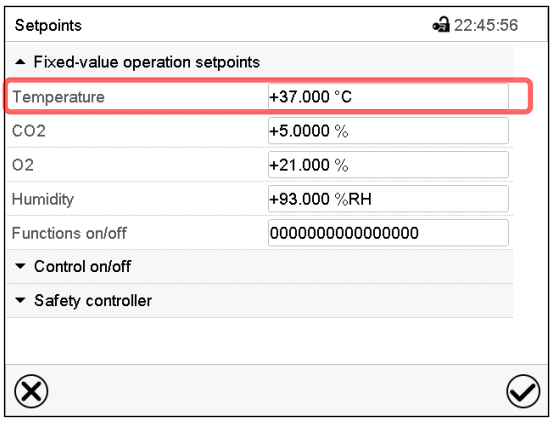
	With set-point type “**Limit**”, adapt the safety controller (chap. 12.2) always when you changed the temperature set-point. Set the safety controller set-point by approx. 2 °C above the controller temperature set-point. Recommended setting: Set-point type “**Offset**” with safety controller set-point 2 °C.

	When setting a lower temperature setpoint, in order to save time, we recommend cooling down the chamber by turning it off and opening both chamber doors.

	When setting a lower CO_2 , O_2 or humidity setpoint, the gas or humidity must be able to escape first. Open both chamber doors for this purpose. Observe the precautions when working with gases (chap. 1.9).

7.1 Set-point entry through the “Setpoints” menu

	Press the ***Setpoint setting*** icon to access the “Setpoint” setting menu from Normal display.



“Setpoints” menu.

Select “Fixed value operation setpoints” to access the individual parameters.

- Select the field “Temperature” and enter the desired temperature setpoint.

  CB/CBF (E7): Setting range: 20 °C up to 60 °C / *140 °F*

  CB/CBF (E7.1): Setting range: 20 °C up to 50 °C / *122 °F*

  Confirm entry with ***Confirm*** icon.
- Select the field “CO2” and enter the desired CO_2 setpoint.

  Setting range: 0 vol.-% up to 20 vol.-%.

  Confirm entry with ***Confirm*** icon.

Chamber with O_2 control:

- Select the field “O2” and enter the desired O_2 setpoint.

  Setting range with regular hypoxic control range: 0.2 vol.-% up to 20 vol.-%.

  Setting range with alternative control range: 5 vol.-% up to 90 vol.-%.

  Confirm entry with ***Confirm*** icon.

CBF / CBF-UL*:*

- Select the field “Humidity” and enter the desired humidity setpoint.

  Setting range: 50 % r.h. up to 95 % r.h. Confirm entry with ***Confirm*** icon.

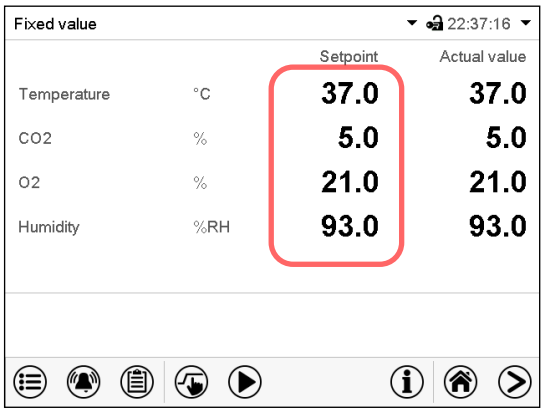
	When entering a humidity setpoint value > 90 % r.h. a message window appears, indicating that condensation is possible. Press the ***Confirm*** icon.

	When entering a setpoint value outside the setting range, the message: “Value outside of limits! (Min: xxx, Max: xxx)” appears (xxx is a wildcard for the limits of the respective parameter). Press the ***Confirm*** icon and repeat the entry with a correct value.

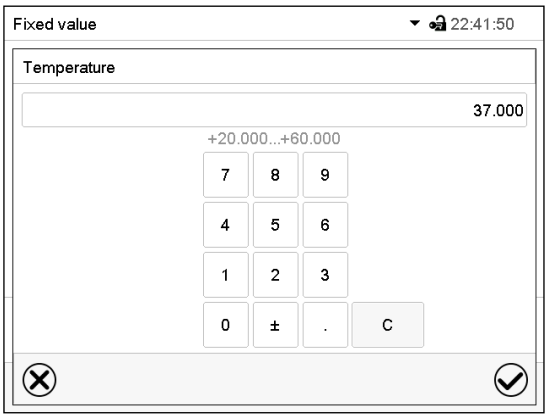
After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu, **or** press the ***Close*** icon to exit the menu without taking over the entries.

7.2 Direct setpoint entry via Normal display

Alternatively you can also enter the setpoints directly via Normal display.



Normal display. Select the setpoint you want to change.



Example: “Temperature” entry menu. Enter the desired setpoint and confirm entry with ***Confirm*** icon.

	When entering a humidity setpoint value > 90 % r.h. a message window appears, indicating that condensation is possible. Press the ***Confirm*** icon.

7.3 Special controller functions

	Press the ***Setpoint setting*** icon to access the “Setpoint” setting menu from Normal display.

You can define the switching state of up to 16 controller functions. They are used to activate / deactivate special controller functions.

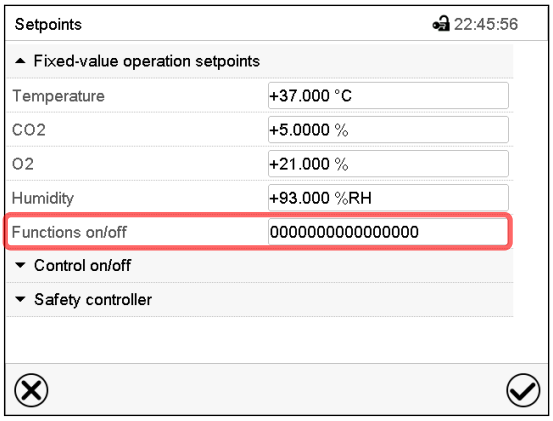
Chamber with O_2 control: Depending on the required range of O_2 concentration, the type of gas which is required may vary (chap. 6.6). Therefore, the pressure alarms for O_2 and N_2 can be deactivated individually with active O_2 control.

For chambers equipped with the optional interior socket (chap. 18.4) you can turn on and off the voltage of the interior socket via the controller.

- Controller function “Idle mode” activates / deactivates the operating mode “Idle mode”.
- Controller function “O2 pressure alarm off” activates / deactivates the O_2 pressure alarm (chamber with O_2 control and optional alternative control range)
- Controller function “N2 pressure alarm off” activates / deactivates the N_2 pressure alarm (chamber with O_2 control)
- Controller function “Interior socket” activates / deactivates interior socket (option, available via BINDER INDIVIDUAL Customized Solutions)

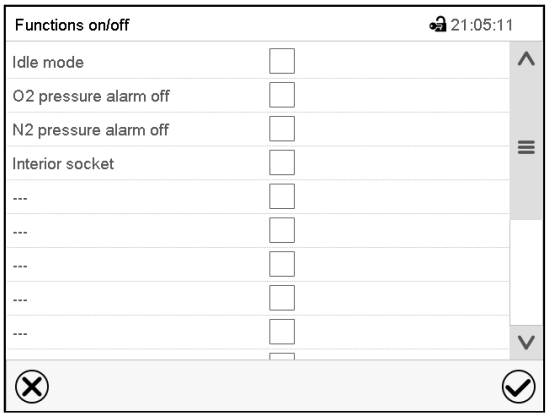
The other controller functions are without function.

Use the “Setpoints” menu to configure the controller functions.



“Setpoints” menu.

Select the field “Functions on/off”.



“Functions on/off” entry menu (view with chamber with O_2 control with optional interior socket).

Mark / unmark the checkbox to activate / deactivate the desired function and press the ***Confirm*** icon

Activated controller function: switching status “1” (On)

Deactivated controller function: switching status “0” (Off)

The controller functions count from right to left.

Example:

Activated controller function “Idle mode” = 000000000000000**1**

Deactivated controller function “Idle mode” = 000000000000000**0**

7.4 Safety instructions for setting high gas concentrations

Notes on handling carbon dioxide (CO_2)

Carbon dioxide (CO_2) in high concentrations is hazardous to health. It is colorless and almost odorless and therefore practically imperceptible. Escaping CO_2 gas is heavier than air and accumulates at the ground or possibly in lower-lying parts of the building. There is danger of suffocation and poisoning. Hazards due to uncontrolled gas release must be effectively avoided. Vent out any CO_2 gas that may escape via good room ventilation or a suitable connection to an exhaust system. The installation of a CO_2 warning system is mandatory. It should be located 30 cm / *11.8 in* above ground. The signal must be visible from the outside.

DANGER

Danger of suffocation and poisoning by high concentration of CO_2 (> 4 Vol.-%). Death by suffocation.

- ∅ Do NOT set up chambers in non-ventilated recesses.
- ➢ Ensure technical ventilation measures.
- ➢ Observe the relevant regulations for handling CO_2.
- ➢ Close the CO_2 supply when decommissioning the chamber.

If CO_2 is released, leave the area und inform the security service or fire department.

Chamber with O_2 control: **Notes on handling oxygen (O_2)**

Oxygen (O_2) is colorless and almost odorless and therefore practically imperceptible. It promotes burns, which can proceed explosively. There is a fire hazard for flammable oxygenated materials, e.g. clothes and hair. O_2 is heavier than air and may accumulate in low-lying areas.

	DANGER **Danger of fire and explosion through contact of combustible materials with O_2 with high concentration of O_2 (> 21 % O_2).** **Serious injury or death from burns and / or explosion pressure.** ∅ Do NOT set up chambers in non-ventilated recesses. ➢ Ensure technical ventilation measures. ➢ Observe the relevant regulations for handling O_2. ➢ Close the O_2 supply when decommissioning the chamber.

Take appropriate measures to prevent oxygen enrichment and fire and explosion hazards in areas where oxygen enrichment is possible.

Observe the general information for safe handling of oxygen (chap. 1.9).

Chamber with O_2 control: **Notes on handling nitrogen (N_2)**

Nitrogen (N_2) in high concentrations is hazardous to health. It is colorless and almost odorless and therefore practically imperceptible. Any N_2 gas that may escape must be safely led out via good room ventilation or a suitable connection to an exhaust system.

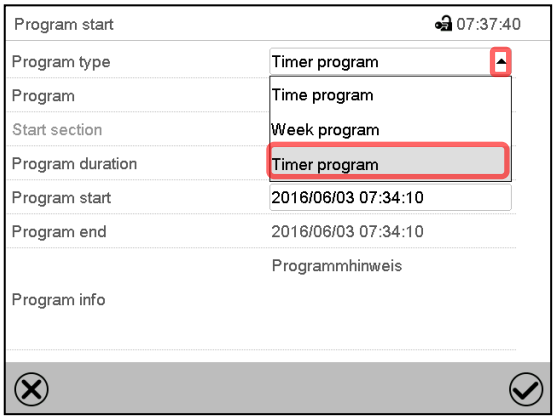
	DANGER **Risk of suffocation through high concentration of N_2.** **Death by suffocation.** ∅ Do NOT set up chambers in non-ventilated recesses. ➢ Ensure technical ventilation measures. ➢ Observe the relevant regulations for handling N_2. ➢ Close the N_2 supply when decommissioning the chamber.

8. Timer program: stopwatch function

During an entered duration the controller constantly equilibrates to the setpoints entered in Fixed value operation mode (temperature, CO_2, O_2 (chamber with O_2 control), humidity (CBF / CBF-UL), configuration of the special controller functions). This duration can be entered as a “Timer program”. During the program runtime, any setpoint changes do not become effective; the controller equilibrates to the values which were active during program start.

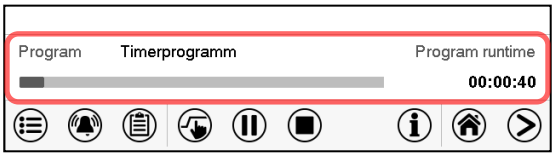
8.1 Starting a timer program

▶	In Normal display press the ***Program start*** icon to access the “Program start” menu.



“Program start” menu

- In the field “Program type” select “Timer program”.
- Select the field “Program duration” and enter the desired program duration. Press the ***Confirm*** icon.
- Select the field “Program start” and enter the desired start time of the program in the “Program start” entry menu. Press the ***Confirm*** icon. The program delay time until program start begins.



Normal display.

Information on the bottom of the screen indicates the currently running program and the time already passed. The grey bar shows how much time of the whole time is elapsed.

8.1.1 Performance during program delay time

During the configured program delay time until program start, the controller equilibrates to the current setpoints of Fixed value operation mode. Modifications of these setpoints are possible but become effective only after the timer program is finished. When the configured moment for program start is reached, the program delay time ends and the program starts running. The controller equilibrates to the values which had been active during program start

8.2 Cancelling a running timer program

■	Press the ***Program cancelling*** icon to cancel the program.

A confirmation prompt is displayed. Press the ***Confirm*** icon to confirm that the program shall really be cancelled.

After confirming the message the controller changes to Fixed value operation mode. The chamber will then equilibrate to the setpoints of Fixed value operation mode.

8.3 Performance after the end of the program

After the end of the program the message “Device changes to fixed value operation mode” appears on the screen.

Press the ***Confirm*** icon.

After confirming the message the controller changes to Fixed value operation mode. Temperature and humidity will then equilibrate to the setpoints of Fixed value operation mode.

9. Time programs

The MB2 program controller permits programming time programs with real-time reference. It offers 25 program memory positions with up to 100 program sections each.

For each program section you can enter set-points for temperature, CO_2, O_2 (chamber with O_2 control), and humidity (CBF / CBF-UL), section duration, type of set-point transition (ramp or step) and the tolerance ranges.

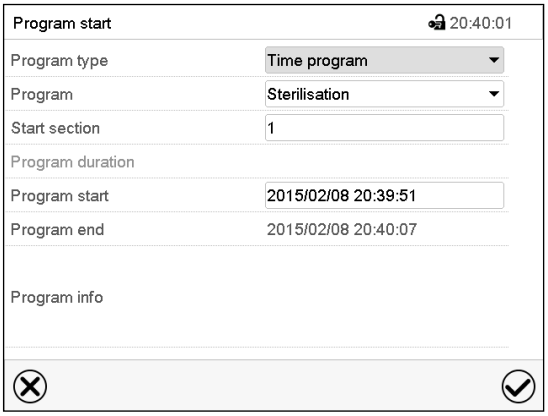
	If the safety controller has been set to “limit” mode, check the setting of the safety controller when changing the temperature set-point, (chap. 12.2).

Programming remains saved in case of a power failure or after turning off the unit.

Path: ***Main menu > Programs> Time program***

9.1 Starting an existing time program

	In Normal display press the ***Program start*** icon to access the “Program start” menu.



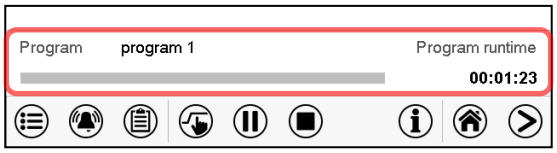
“Program start” menu

- In the field “Program type” select the setting “Time program”.
- In the field “Program” select the desired program.
- Select the field “Program start” and enter the desired program start time in the “Program start” entry menu. Press the ***Confirm*** icon. The program delay time until program start begins.

The program end is adapted automatically depending on the entered program duration.

After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu. The program starts running.

If instead you press the ***Close*** icon to exit the menu without taking over the entries, the program will not start.



Normal display. Information on the bottom of the screen indicates the currently running program and the time already passed. The grey bar shows how much time of the whole time is elapsed. If program duration has been set to infinite, the grey bar is not displayed.

9.1.1 Performance during program delay time

During the configured program delay time until program start, the controller equilibrates to the current setpoints of Fixed value operation mode. Modifications of these setpoints are effective. When the configured moment for program start is reached, the program delay time ends and the program starts running.

9.2 Stopping a running time program

9.2.1 Pausing a running time program

⏸	Press the ***Program pause*** icon to interrupt the program..

The program is paused. The program runtime stops running down, the time display flashes.

There are the following options:

▶	Press the ***Program start*** icon to continue the program
■	Press the ***Cancelling*** icon to cancel the program

9.2.2 Cancelling a running time program

■	Press the ***Program cancelling*** icon to cancel the program.

A confirmation prompt is displayed. Press the ***Confirm*** icon to confirm that the program shall really be cancelled.

After confirming the message, the controller changes to Fixed value operation mode. All values will then equilibrate to the setpoints of Fixed value operation mode.

9.3 Performance after the end of the program

After the end of the program the message “Device changes to fixed value operation mode” appears on the screen.

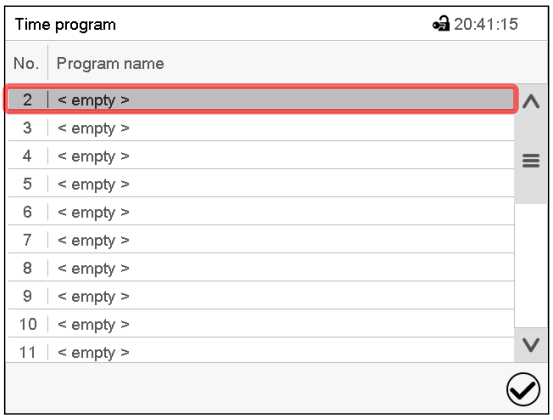
Press the ***Confirm*** icon.

As long as the message has not been confirmed, the setpoint of the last program section remains effective. Program the last section as desired. If the heating, CO_2 control, O_2 control (chamber with O_2 control) and humidification (CBF / CBF-UL) shall turn off, activate controller function “Idle mode” in the last program section.

After confirming the message the controller changes to Fixed value operation mode. The setpoints of Fixed value operation mode are then equilibrated.

9.4 Creating a new time program

Path: ***Main menu > Programs > Time program***



“Time program” menu:
overview of the existing programs.

Select an empty program place.

Enter the program name and, if desired, additional program information in the corresponding fields.

Press the ***Confirm*** icon.

The program view opens (chap. 9.5).

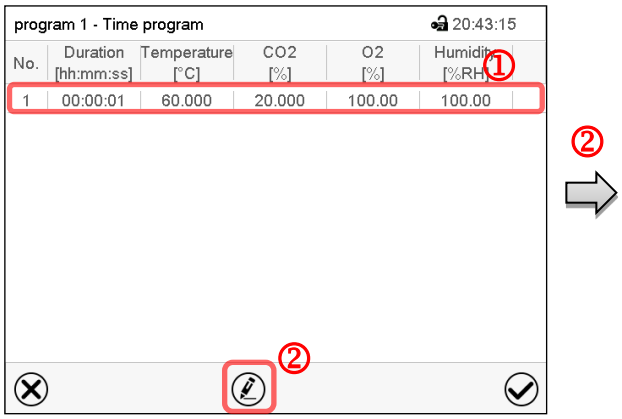
9.5 Program editor: program management

Path: ***Main menu > Programs > Time program***

“Time program” menu:
overview of the existing programs.

Select an existing program (example: program 3) or create a new program (chap. 9.4).

The program view opens.



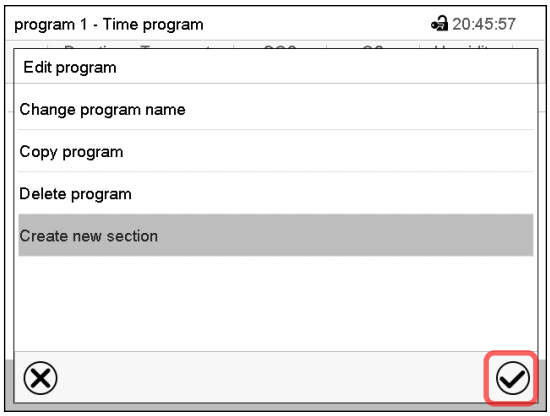
Program view (example: program 1).

If a new program has been created, there is just one program section.

There are the following options:

① Select a program section to open the section editor (chap. 9.6)

② Press the ***Edit*** icon to open the program editor

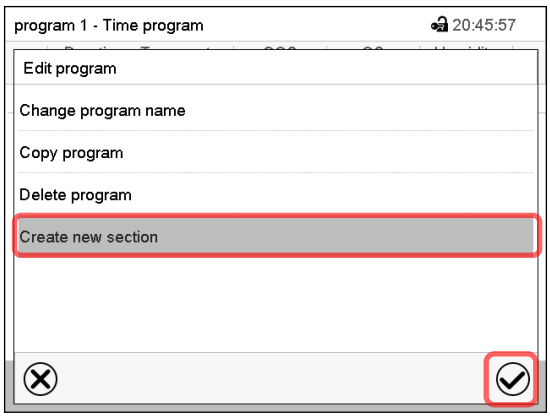


Program editor: “Edit program” menu

Select the desired function and press the ***Confirm*** icon.

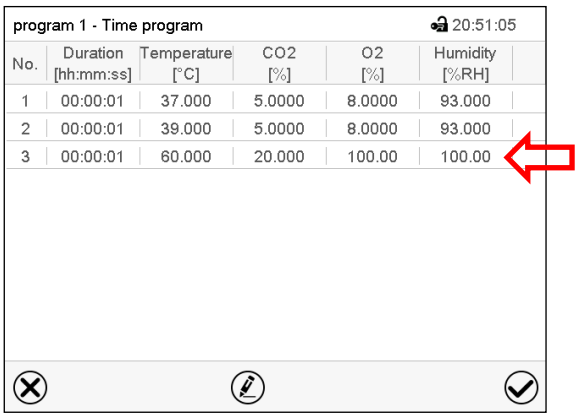
The program editor offers following options:

- Change the program name
- Copy program
- Replace program: Replacing an new or an existing program with the copied program. This menu point is visible only after a program has been copied.
- Delete program
- Create new section



To add a new section, select “Create new section” and press the ***Confirm*** icon.

The program view opens.



Program view.

A new section is always added at the very bottom (example: section 3).

9.5.1 Deleting a time program

Path: ***Main menu > Programs > Time program***

In the “Time program” menu select the program to be deleted. The program view opens.

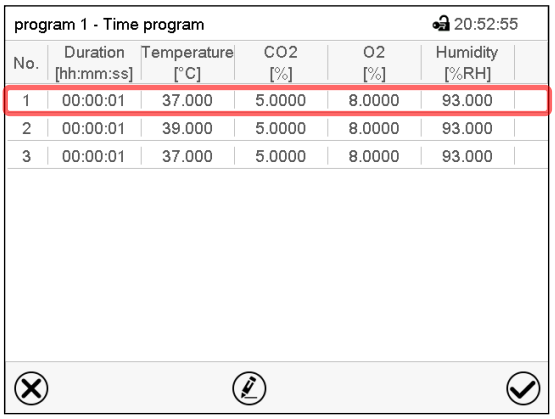
In the **program view** press the ***Edit*** icon to open the program editor

In the **program editor** select “Delete program” and press the ***Confirm*** icon.
The program is deleted. The controller returns to the program view.

9.6 Section editor: section management

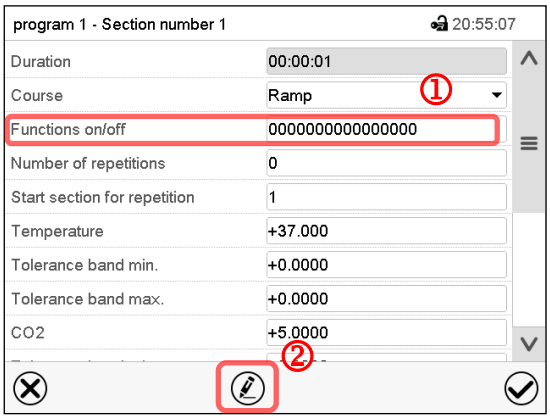
Path: ***Main menu > Programs > Time program***

Select the desired program.



Program view.

Select the desired program section (example: section 1)

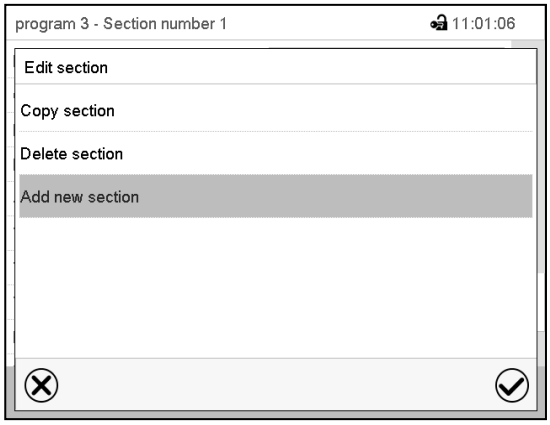


Section view (example: section 1).

There are the following options:

① Select a parameter to enter or modify the according value (chap. 9.7)

② Press the ***Edit*** icon to open the program editor



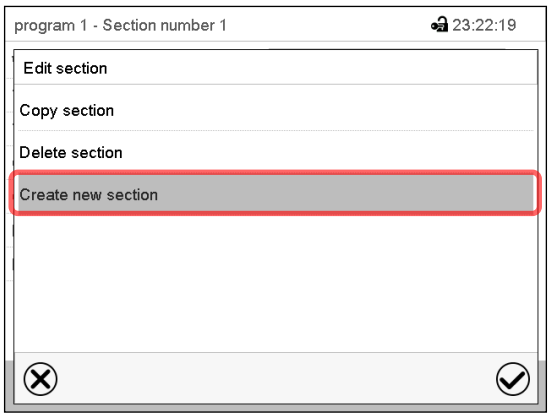
Section editor: “Edit section” menu

Select the desired function and press the ***Confirm*** icon.

The section editor offers following options:

- Copy section
- Replace section: Replacing an existing section with the copied section. This menu point is visible only after a section has been copied.
- Insert section: Adding the copied section. This menu point is visible only after a section has been copied.
- Delete section
- Add new section

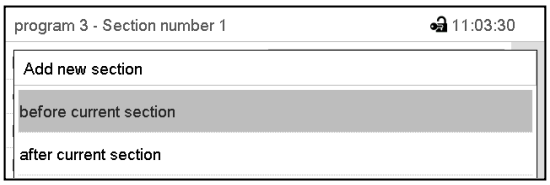
9.6.1 Add a new program section



Section editor: “Edit section” menu.

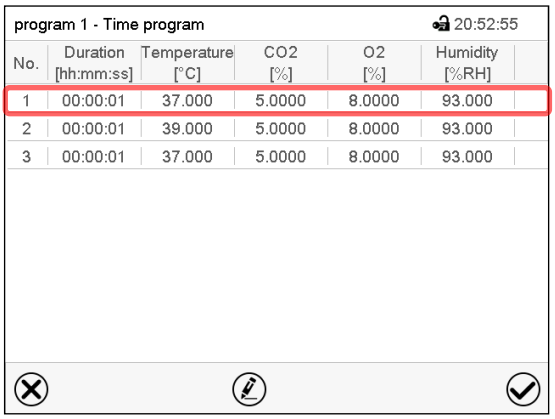
Select “Create new section” and press the ***Confirm*** icon.

Then select whether to insert the new section before or after the current section.



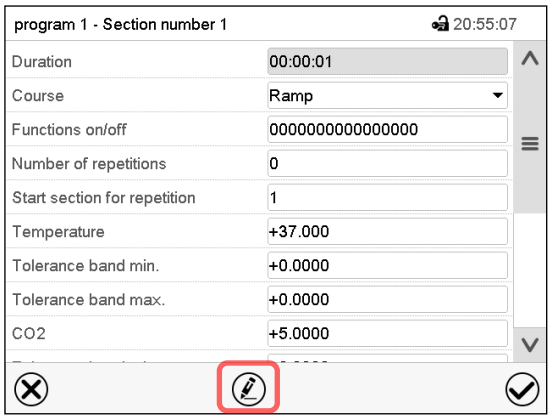
Press the ***Confirm*** icon. The new section opens.

9.6.2 Copy and insert or replace a program section



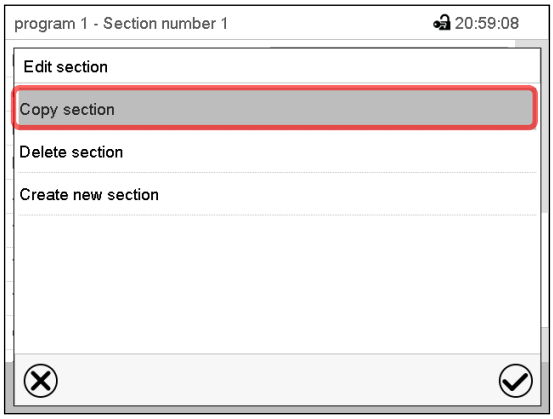
Program view.

Select the program section to be copied (example: section 1)



Section view (example: section 1).

Press the ***Edit*** icon to open the section editor.

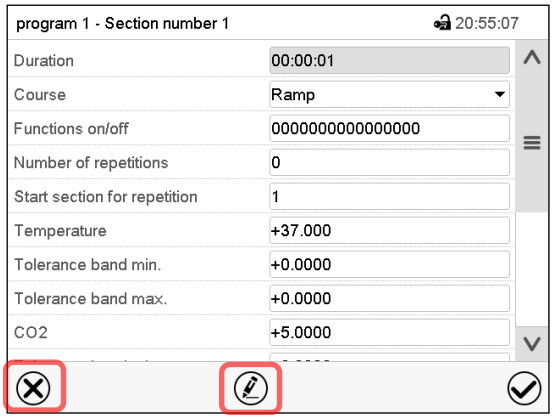


Section editor: “Edit section” menu

Select “Copy section” and press the ***Confirm*** icon.

The current section (example: section 1) is copied.

The controller returns to the section view.

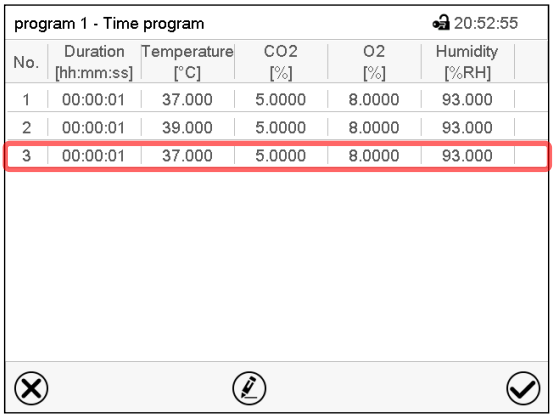


Section view (example: section 1).

Press the ***Close*** icon to change to the program view, if you want to select another section to be replaced or before or after which the copied section shall be inserted…

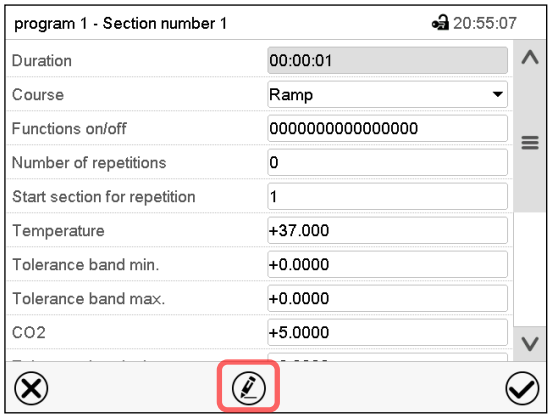
or

Press the ***Edit*** icon to open the section editor if you want the current section to be replaced or the copied section to be inserted before or after it



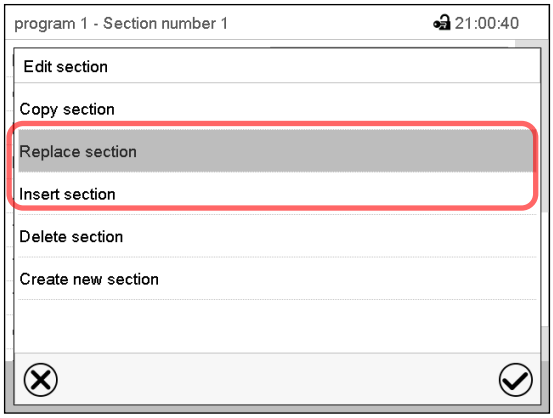
Program view.

Select the section to be replaced or before or after which the copied section shall be inserted (example: section 3) and press the ***Confirm*** icon.



Section view (example: section 1).

Press the ***Edit*** icon to open the section editor



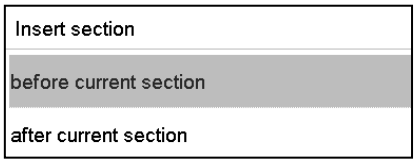
Section editor: “Edit section” menu

Select “Replace section” to replace the selected section with the copied section

or

Select “Insert section” to additionally add the copied section.

In this case select whether to insert it before or after the selected section.



Press the ***Confirm*** icon

9.6.3 Deleting a program section

In the **program view** select the program section to be deleted. The section view opens.

In the **section view** press the ***Edit*** icon to open the section editor

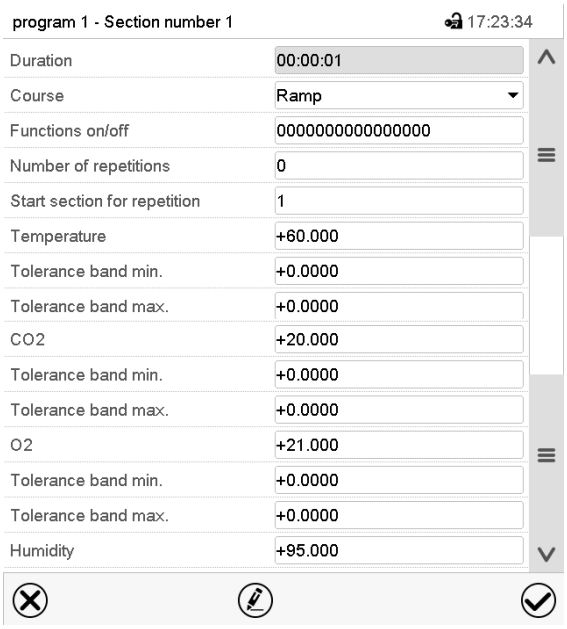
In the **section editor** select “Delete section” and press the ***Confirm*** icon.
The section is deleted. The controller returns to the section view.

9.7 Value entry for a program section

Path: ***Main menu > Programs > Time program***

Select the desired program and section.

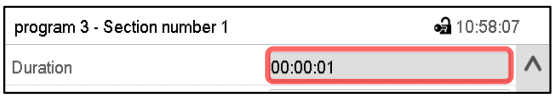
The section view gives access to all parameters of a program section. You can enter or modify the values.



Program name and section number
Section duration
Type of setpoint transition: ramp or step
Special controller functions
Repeating one or several sections within a program
Temperature setpoint
Temperature tolerance range: minimum and maximum
CO_2 setpoint
CO_2 tolerance range: minimum and maximum
O_2 setpoint (chamber with O_2 control)
O_2 tolerance range: minimum and maximum
Humidity setpoint (CBF / CBF-UL)

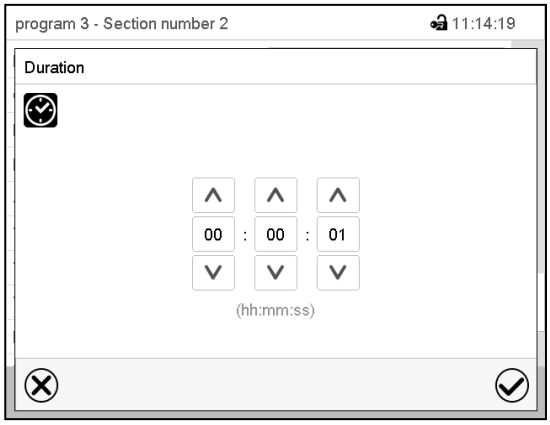
The setting and control ranges for the individual parameters are the same as for “Fixed value” operating mode (chap. 7).

9.7.1 Section duration



Section view (partial view).

Select the field “Duration” indicating the time.



“Duration” entry menu.

Enter the desired section duration with the arrow keys and press the ***Confirm*** icon.

Setting range: 0 up to 99 hours 59 min 59 sec.

9.7.2 Set-point ramp and set-point step

You can define the type of transitions for temperature, CO_2 concentration, O_2 concentration (chamber with O_2 control) and humidity (CBF / CBF-UL) for each individual program section.

“Ramp” mode: Gradual set-points changes

The set-point of a given program section functions as the section’s start value. During the section’s duration, each set-point gradually passes to the set-point of the subsequent program section. The actual value follows the continually changing set-point.

If the last program section is in “ramp” mode and the setpoint shall change within this section, then you must program an additional section (with the shortest possible section duration) to provide the target value of the last program section. Otherwise, the setpoint would remain constant during the section’s duration.

Programming in the “ramp” mode allows all kinds of temperature and CO_2 / O_2 and humidity transitions:

- Gradual changes of temperature and CO_2 / O_2 concentration and humidity

  The setpoint changes its value gradually during the entered section duration. The actual value follows the continually moving set-point at any time.

- Program sections with constant temperature and CO_2 / O_2 concentration and humidity

  The setpoints (initial values) of two subsequent program sections are identical; so the temperature, CO_2 / O_2 and humidity remain constant during the entire duration of the first program section.

- Sudden changes of temperature and CO_2 / O_2 concentration and humidity

  Steps can be programmed in ramp mode as temperature / CO_2 / O_2 / humidity changes (ramps) that occur during a very short interval. If the duration of this transitional program section is very short (minimum entry 1 sec), the temperature, CO_2 / O_2 or humidity change will proceed rapidly within the minimum amount of time.

“Step” mode: Sudden set-points changes

The set-point of any program section functions as the section’s target value. At the start of the program section, heating up, attaining the set gas concentration and humidification occur with the maximum speed to reach the set-point values and then remain constant for the remaining section time. Therefore the set-points remain constant for the section’s duration. These changes occur rapidly within the minimum amount of time (minimum entry: 1 second).

Programming in the “step” mode allows only two kinds of temperature / CO_2 / O_2 / humidity transitions:

- Programming gradual changes of temperature / CO_2 / O_2 / humidity (ramps) is impossible in the “step” mode

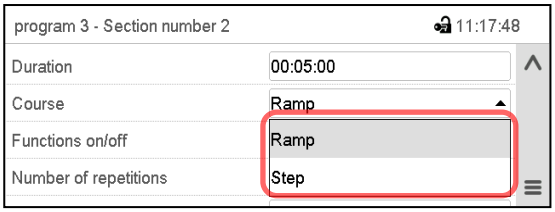
- Program sections with constant temperature and CO_2 / O_2 concentration and humidity

  The setpoints (target values) of two subsequent program sections are identical; so the temperature / CO_2 / O_2 / humidity remain constant during the entire duration of the first program section.

- Sudden changes of temperature and CO_2 / O_2 concentration and humidity

  The entered setpoint of the section is reached as fast as possible and then held constant for the remaining section duration.

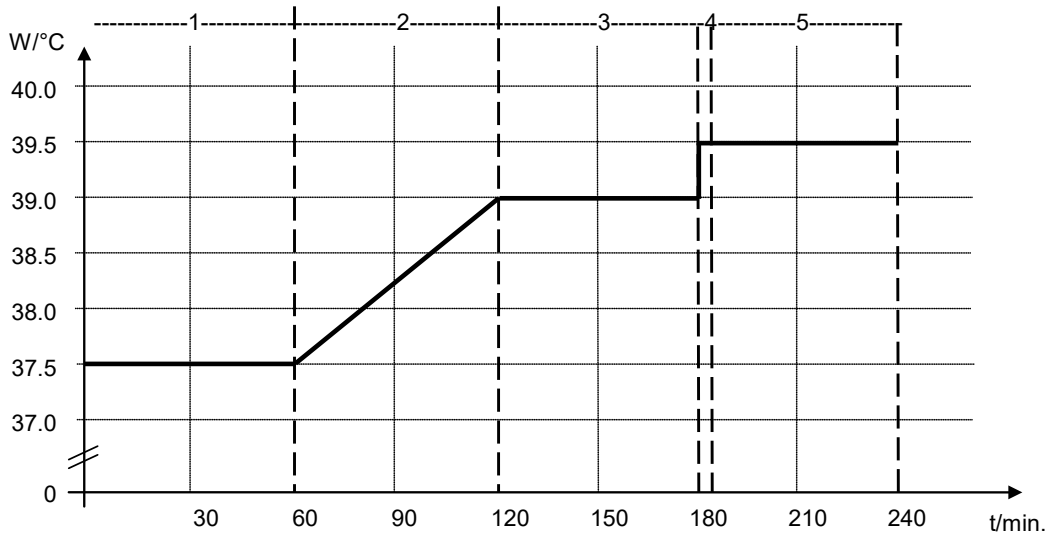
Selecting the setting “Ramp” or “Step”



Section view (partial view).

In the field “Course” select the desired setting “Ramp” or “Step”.

“Ramp” and “Step” mode example (representation of a temperature course)



Corresponding program table

Section No.	Duration [hh:mm:ss]	Temperature [°C]	CO2 [Vol.-%]	O2 [Vol.-%]	Humidity [% rH]	Ramp or Step
1	01:00:00	37.5	xxxx	xxxx	xxxx	Step
2	01:00:00	37.5	xxxx	xxxx	xxxx	Ramp
3	01:00:00	39.0	xxxx	xxxx	xxxx	Step
4	00:00:10	39.5	xxxx	xxxx	xxxx	Step
5	01:00:00	39.5	xxxx	xxxx	xxxx	Step

9.7.3 Special controller functions

You can define the switching state of up to 16 controller functions. They are used to activate / deactivate special controller functions.

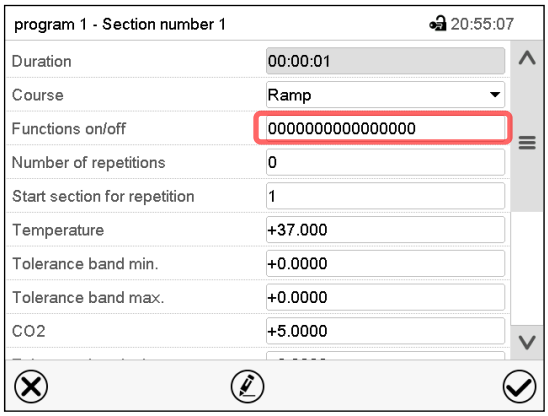
Chamber with O_2 control: Depending on the required range of O_2 concentration, the type of gas which is required may vary (chap. 6.6). Therefore, the pressure alarms for O_2 and N_2 can be deactivated individually with active O_2 control.

For chambers equipped with the optional interior socket (chap. 18.4) you can turn on and off the voltage of the interior socket via the controller.

- Controller function “Idle mode” activates / deactivates the operating mode “Idle mode”.
- Controller function “O2 pressure alarm off” activates / deactivates the O_2 pressure alarm (chamber with O_2 control and optional alternative control range)
- Controller function “N2 pressure alarm off” activates / deactivates the N_2 pressure alarm (chamber with O_2 control)
- Controller function “Interior socket” activates / deactivates interior socket (option, available via BINDER INDIVIDUAL Customized Solutions)

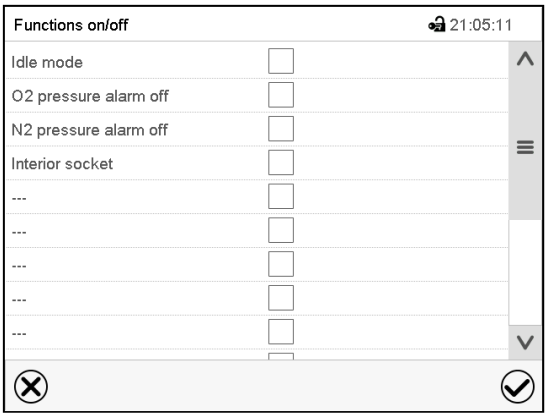
The other controller functions are without function.

Use the Section editor to configure the controller functions.



Section view.

Select the field “Functions on/off”.



“Functions on/off” entry menu (view with chamber with O_2 control with optional interior socket).

Mark / unmark the checkbox of the desired function to activate / deactivate it and press the Confirm icon.

The controller returns to the section view.

Activated controller function: switching status “1” (On)

Deactivated controller function: switching status “0” (Off)

The controller functions count from right to left.

Example:

Activated controller function “Idle mode” = 000000000000000**1**

Deactivated controller function “Idle mode” = 000000000000000**0**

9.7.4 Setpoint entry

- Select the field “Temperature” and enter the desired temperature setpoint.

  CB/CBF (E7): Setting range: 20 °C up to 60 °C / *140 °F*

  CB/CBF (E7.1): Setting range: 20 °C up to 50 °C / *122 °F*

  Confirm entry with ***Confirm*** icon. The controller returns to the section view.
- Select the field “CO2” and enter the desired CO_2 setpoint.

  Setting range: 0 vol.-% up to 20 vol.-%.

  Confirm entry with ***Confirm*** icon. The controller returns to the section view.

Chamber with O_2 control:

- Select the field “O2” and enter the desired O_2 setpoint.

  Setting range with regular hypoxic control range: 0.2 vol.-% up to 20 vol.-%.

  Setting range with alternative control range: 5 vol.-% up to 90 vol.-%.

  Confirm entry with ***Confirm*** icon. The controller returns to the section view.

CBF / CBF-UL:

- Select the field “Humidity” and enter the desired humidity setpoint.

  Setting range: 50 % r.h. up to 95 % r.h.

  Confirm entry with ***Confirm*** icon. The controller returns to the section view.

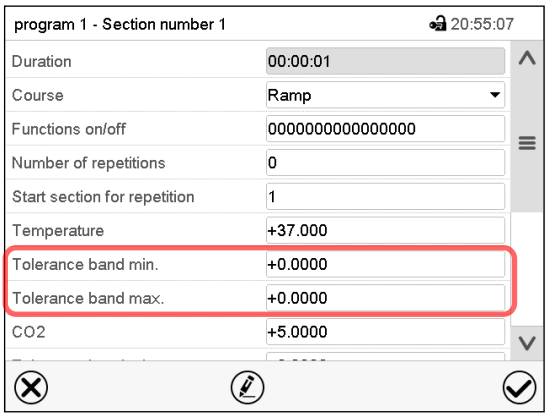
9.7.5 Tolerance range

You can specify tolerance ranges for temperature, CO_2 and O_2 (chamber with O_2 control) and humidity (CBF / CBF-UL) for each program section with different values for the tolerance minimum and maximum. When the actual value exceeds the given threshold, the program is interrupted. This is indicated on the display (see below). When the actual temperature is situated again within the entered tolerance limits, the program automatically continues. Therefore, the duration of the program may be extended due to the programming of tolerances.

	Programming of tolerances may extend program duration.

An entry of “-99999” for the tolerance minimum means “minus infinite” and an entry of “999999” for the tolerance maximum means “plus infinite”. Entry of these values will never lead to program interruption. The entry of “0” for the tolerance minimum and/or maximum deactivates the respective tolerance function.

When requesting rapid value transitions, we recommend not programming tolerance values in order to enable the maximum speed for heating-up and CO_2 / O_2 control, and humidification.



Section view, showing the temperature tolerance band

- Select the field “Tolerance band min” and enter the desired lower tolerance band value. Setting range: -99999 to 99999. Confirm entry with ***Confirm*** icon. The controller returns to the section view.
- Select the field “Tolerance band max” and enter the desired upper tolerance band value. Setting range: -99999 to 99999. Confirm entry with ***Confirm*** icon. The controller returns to the section view.

Set the tolerance ranges for other parameters accordingly, if desired.

If one of the actual values (temperature, CO_2, O_2 , humidity) is outside the program tolerance range the whole program course is interrupted. During this program interruption time the controller equilibrates to the set-points of the current section.

The screen header indicates “Program pause (tolerance band)”. The program runtime indication flashes and does not proceed any further.

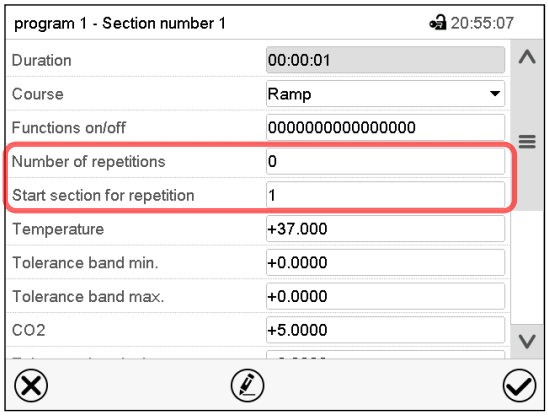
When the temperature or CO_2 / O_2 or humidity values are back within the entered program tolerance range, the program continues automatically.

9.7.6 Repeating one or several sections within a time program

You can repeat several subsequent sections together. It is not possible to define the start section the same time also as the target section, therefore you cannot repeat a single individual section.

Enter the desired number of repetitions in the field „Number of repetitions“ and the number of the section to start the repetition cycle with in the field “Start section for repetition” To have sections repeated infinitely, enter the number of repetitions as “-1”.

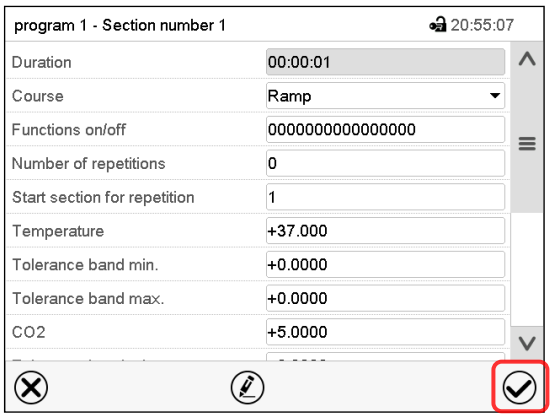
The selected sections are repeated as many times as selected. Then the program continues.



Section view, showing the repetition function

- Select the field “Number of repetitions” and enter the desired number of repetitions. Setting range: 1 to 99, and -1 for infinite. Confirm entry with Confirm icon. The controller returns to the section view.
- Select the field “Start section for repetition” and enter the section number, at which the repetition should start. Setting range: 1 up to the section before the currently selected section. Confirm entry with ***Confirm*** icon. The controller returns to the section view.

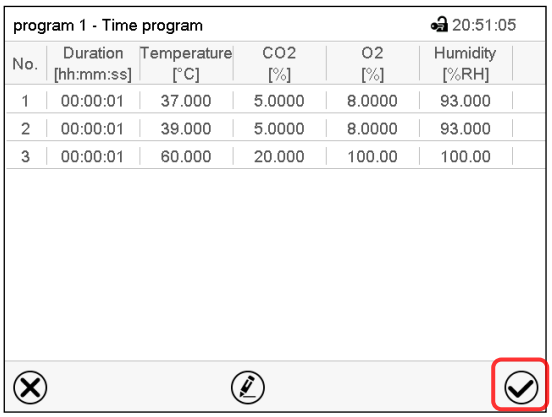
9.7.7 Saving the time program



Section view.

After the all desired values of the program section have been configured, press the ***Confirm*** icon to take over the programming.

The controller changes to the program view.



Program view.

Press the ***Confirm*** icon to take over the programming.

The controller changes to the Normal display.

	To save the programming it is absolutely required to press the ***Confirm*** icon. Otherwise all settings will be lost! There is no confirmation prompt!

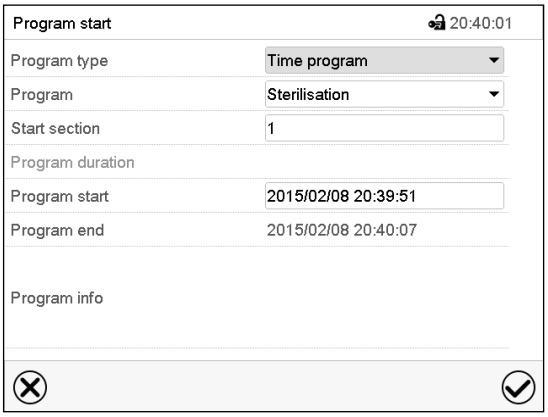
10. Week programs

The MB2 program controller permits programming week programs with real-time reference. It offers 5 week program places in total with up to 100 shift points for each week program.

Path: ***Main menu > Programs> Week program***

10.1 Starting an existing week program

	In Normal display press the ***Program start*** icon to access the “Program start” menu.



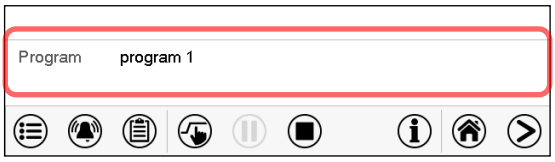
“Program start” menu.

- In the field “Program type” select the setting “Week program”.
- In the field “Program” select the desired program.
- There are no further settings available in the “Program start” menu for week programs, as they are needed only for time programs.

After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu. The program starts running.

If instead you press the ***Close*** icon to exit the menu without taking over the entries, the program will not start.

After starting the week program, the previously entered week program setpoints are active and will be equilibrated according to the current time.



Information on the bottom of the screen indicates the currently running program.

10.2 Cancelling a running week program

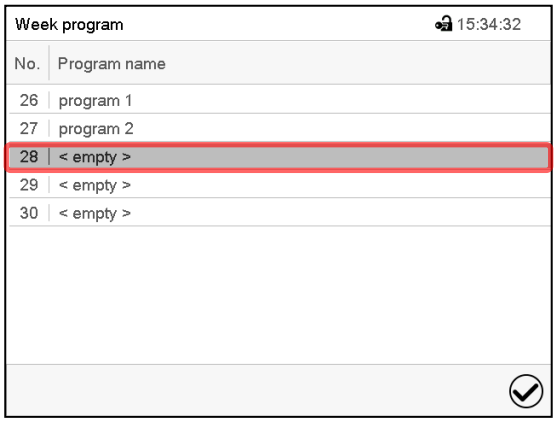
■	Press the ***Program cancelling*** icon to cancel the program.

A confirmation prompt is displayed. Press the ***Confirm*** icon to confirm that the program shall really be cancelled.

After confirming the message the controller changes to Fixed value operation mode. The chamber will then equilibrate to the setpoints of Fixed value operation mode.

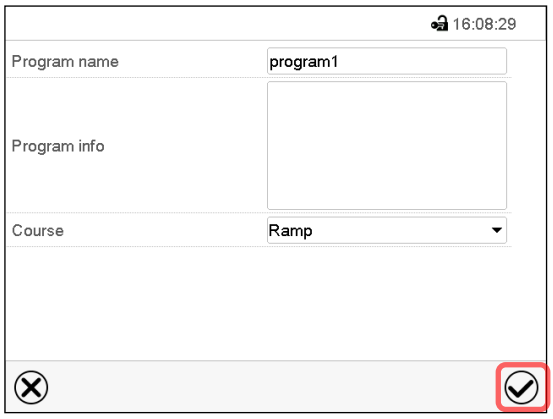
10.3 Creating a new week program

Path: ***Main menu > Programs > Week program***



“Week program” menu:
overview of the existing programs.

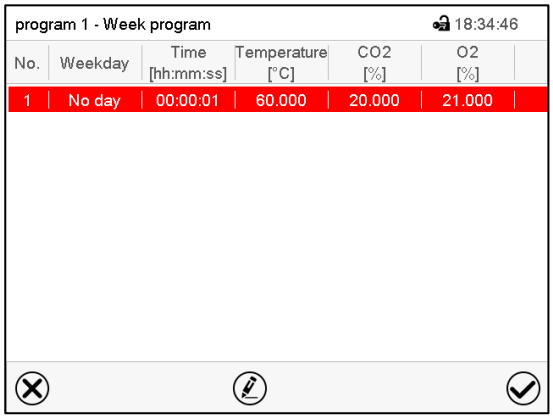
Select an empty program place.



Enter the program name and, if desired, additional program information in the corresponding fields.

Select the set-point course “Ramp” or “Step” (chap. 10.6.1).

Press the ***Confirm*** icon. The program view opens.

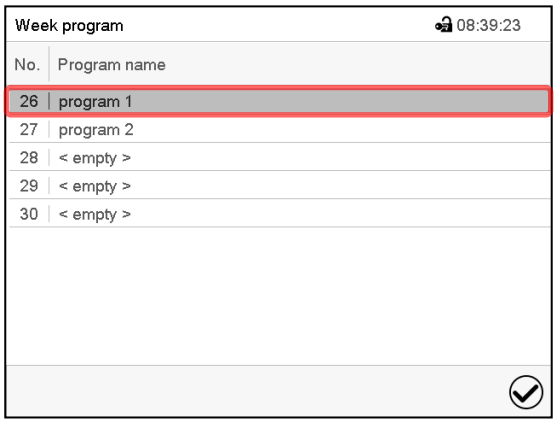


Program view.

For the first section no weekday is specified. Therefore the section is first marked in red and cannot be saved.

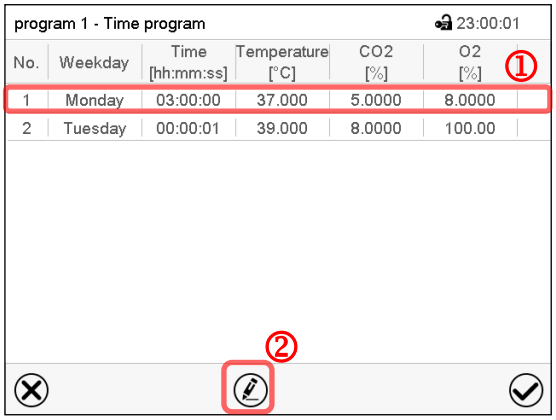
10.4 Program editor: program management

Path: ***Main menu > Programs > Week program***



“Week program” menu:
overview of the existing programs.

Select an existing program
(example: program 1).



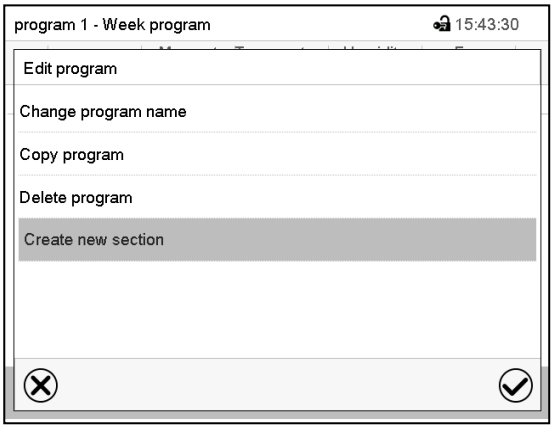
Program view (example: program 1).

If a new program has been created, there is just one program section.

There are the following options:

① Select a program section to open the section editor (chap. 10.4.1)

② Press the ***Edit*** icon to open the program editor

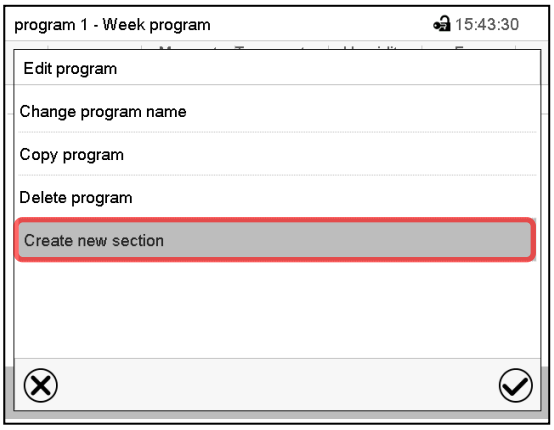


Program editor: “Edit program” menu.

Select the desired function and press the ***Confirm*** icon.

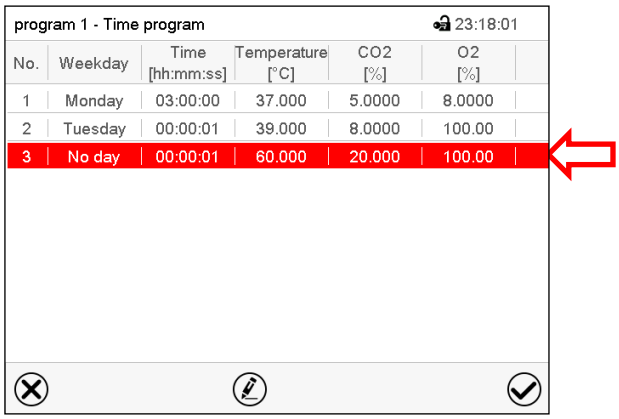
The program editor offers following options:

- Change program name. This menu also offers to configure the ramp / step mode setting (chap. 10.6.1).
- Copy program
- Replace program: Replacing an new or an existing program with the copied program. This menu point is visible only after a section has been copied.
- Delete program
- Create new section



To add a new section, select “Create new section” and press the ***Confirm*** icon.

The program view opens.



Program view.

With a new section no weekday is specified. Therefore the section is first marked in red and cannot be saved.

A new section is always added at the very bottom (example: section 3). When the section start is specified the sections are automatically arranged in the correct chronological order.

10.4.1 Deleting a week program

Path: ***Main menu > Programs > Week program***

In the “Week program” menu select the program to be deleted. The program view opens.

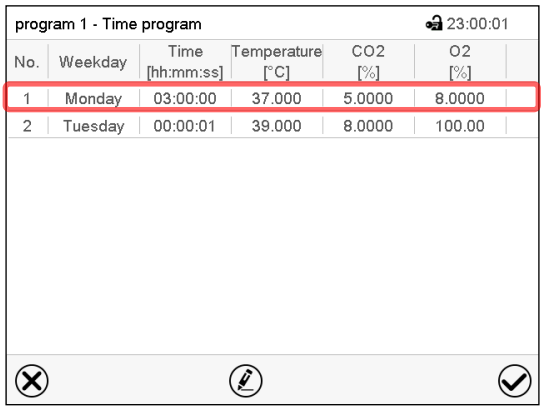
In the **program view** press the ***Edit*** icon to open the program editor

In the **program editor** select “Delete program” and press the ***Confirm*** icon.
The program is deleted. The controller returns to the program view.

10.5 Section editor: section management

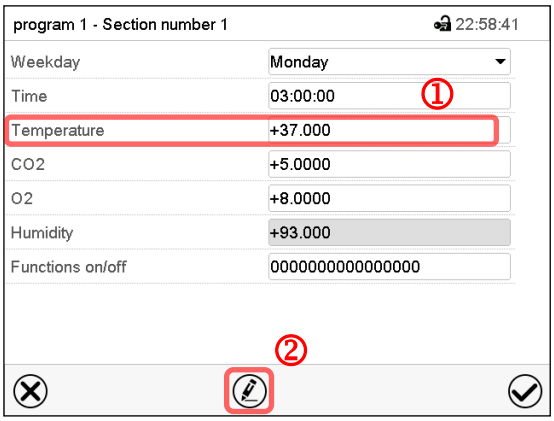
Path: ***Main menu > Programs > Week program***

Select the desired program.



Program view.

Select the desired program section (example: section 1)

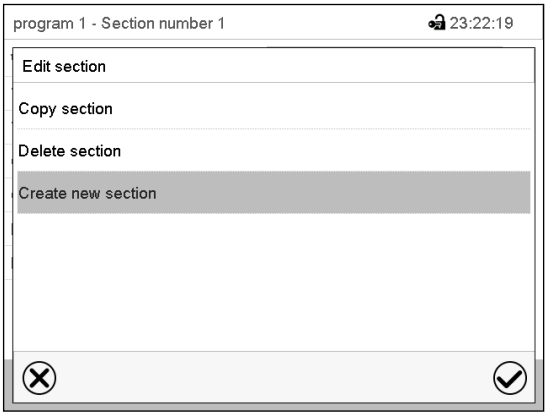


Section view (example: section 1).

There are the following options:

① Select a parameter to enter or modify the according value (chap. 10.6)

② Press the ***Edit*** icon to open the program editor



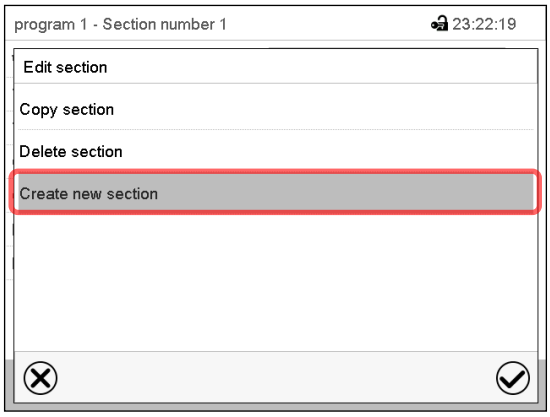
Section editor: “Edit section” menu

Select the desired function and press the ***Confirm*** icon.

The section editor offers following options:

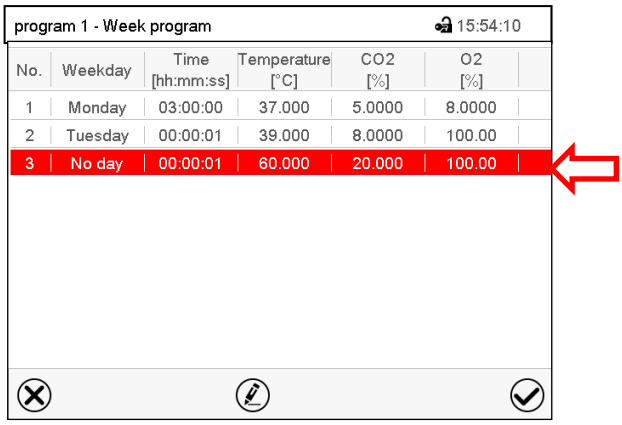
- Copy section
- Replace section: Replacing an existing section with the copied section. This menu point is visible only after a section has been copied.
- Insert section: Adding the copied section. This menu point is visible only after a section has been copied.
- Delete section
- Create new section

10.5.1 Add a new program section



Section editor: “Edit section” menu.

Select “Create new section” and press the ***Confirm*** icon.

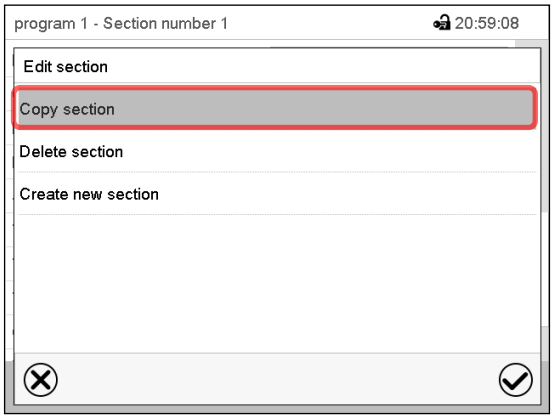


Program view.

With a new section no weekday is specified. Therefore the section is first marked in red and cannot be saved.

A new section is always added at the very bottom (example: section 3). When the section start is specified the sections are automatically arranged in the correct chronological order.

10.5.2 Copy and insert or replace a program section

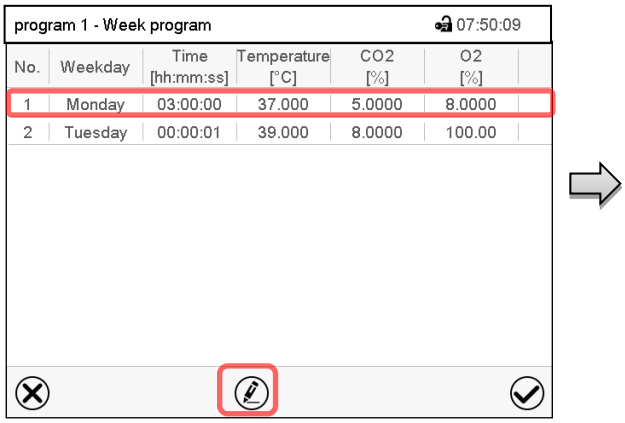


Section editor: “Edit section” menu

Select “Copy section” and press the ***Confirm*** icon.

The current section (example: section 1) is copied.

The controller returns to the program view.

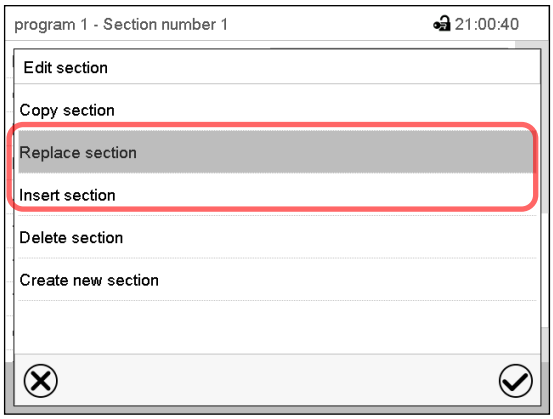


Program view

Select the section to be replaced or before or after which the copied section shall be inserted (example: section 1).

Press the ***Confirm*** icon

The controller returns to the section editor



Section editor: “Edit section” menu

Select “Replace section” to replace the selected section with the copied section

or

Select “Insert section” to additionally add the copied section.

Press the ***Confirm*** icon.

If you selected “Insert section” the sections are automatically arranged in the correct chronological order.

10.5.3 Deleting a program section

In the **program view** select the program section to be deleted. The section view opens.

⇨ In the **section view** press the ***Edit*** icon to open the section editor

⇨ In the **section editor** select “Delete section” and press the ***Confirm*** icon.
The section is deleted. The controller returns to the section view.

10.6 Value entry for a program section

Path: ***Main menu > Programs > Week program***

Select the desired program and section.

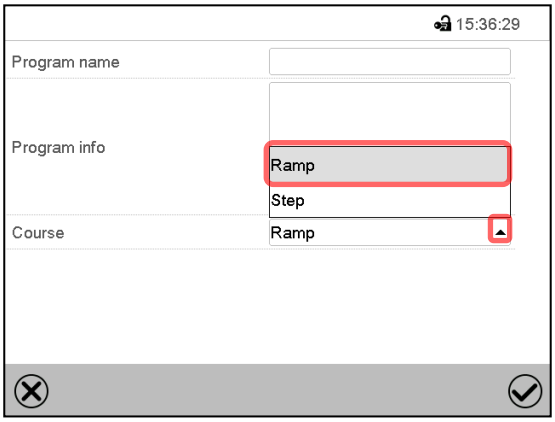
The setting and control ranges for the individual parameters are the same as for “Fixed value” operating mode (chap. 7).

10.6.1 Set-point ramp and set-point step modes

The explanation of the settings “Ramp” or “Step” is given in chap. 9.7.2.

You can define the type of transitions for temperature, CO_2 concentration, O_2 concentration (chamber with O_2 control) and humidity (CBF / CBF-UL) for the entire week program.

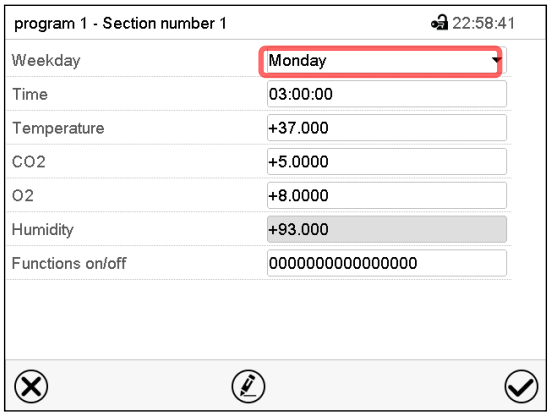
Select the desired program and press the ***Edit*** icon to open the program editor. In the program editor select the “Change program name” function and press the ***Confirm*** icon.



“Change program name” menu.

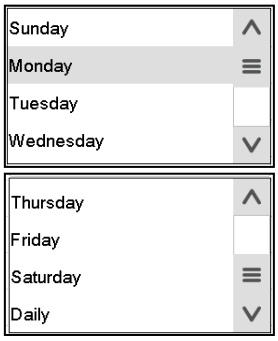
In the field “Course” select the desired setting “Ramp” or “Step” and press the ***Confirm*** icon.

10.6.2 Weekday



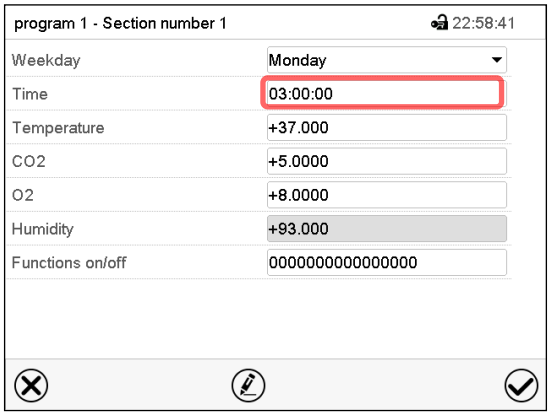
Section view.

In the field “Weekday” select the desired weekday.



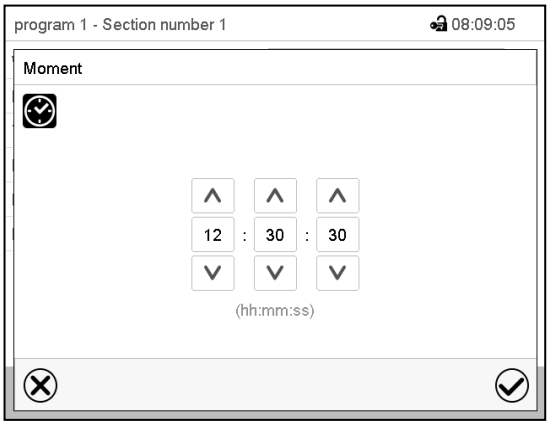
With “Daily” selected, this section will run every day at the same time.

10.6.3 Start time



Section view.

Select the field “Moment”.



Entry menu “Moment”.

Select with the arrow keys the desired start moment of the section and press the ***Confirm*** icon.

10.6.4 Setpoint entry

- Select the field “Temperature” and enter the desired temperature setpoint.

  CB/CBF (E7): Setting range: 20 °C up to 60 °C / *140 °F*

  CB/CBF (E7.1): Setting range: 20 °C up to 50 °C / *122 °F*

  Confirm entry with ***Confirm*** icon. The controller returns to the section view.
- Select the field “CO2” and enter the desired CO_2 setpoint.

  Setting range: 0 vol.-% up to 20 vol.-%.

  Confirm entry with ***Confirm*** icon. The controller returns to the section view.

Chamber with O_2 control:

- Select the field “O2” and enter the desired O_2 setpoint.

  Setting range with regular hypoxic control range: 0.2 vol.-% up to 20 vol.-%.

  Setting range with alternative control range: 5 vol.-% up to 90 vol.-%.

  Confirm entry with ***Confirm*** icon. The controller returns to the section view.

CBF / CBF-UL:

- Select the field “Humidity” and enter the desired humidity setpoint.

  Setting range: 50 % r.h. up to 95 % r.h.

  Confirm entry with ***Confirm*** icon. The controller returns to the section view.

10.6.5 Special controller functions

You can define the switching state of up to 16 controller functions. They are used to activate / deactivate special controller functions.

Chamber with O_2 control: Depending on the required range of O_2 concentration, the type of gas which is required may vary (chap. 6.6). Therefore, the pressure alarms for O_2 and N_2 can be deactivated individually with active O_2 control.

For chambers equipped with the optional interior socket (chap. 18.4) you can turn on and off the voltage of the interior socket via the controller.

- Controller function “Idle mode” activates / deactivates the operating mode “Idle mode”.
- Controller function “O2 pressure alarm off” activates / deactivates the O_2 pressure alarm (chamber with O_2 control and optional alternative control range)
- Controller function “N2 pressure alarm off” activates / deactivates the N_2 pressure alarm (chamber with O_2 control)
- Controller function “Interior socket” activates / deactivates interior socket (option, available via BINDER INDIVIDUAL Customized Solutions)

The other controller functions are without function.

Select the desired program and section. You can set the controller functions in the “Functions on/off” field.

For details please refer to chap. 9.7.3.

11. Notification and alarm functions

11.1 Notification and alarm messages overview

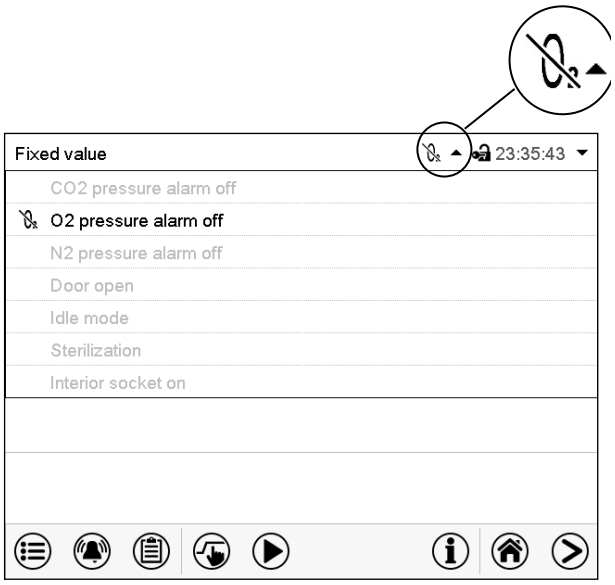
11.1.1 Notifications

Notifications are indicated by **information icons** displayed in the screen header in Normal display

An information icon serves as an indication of a certain condition.

If this condition persists, in some cases an alarm will be triggered after a fix or configurable interval. As long as the condition persists, the information icon therefore continues to be displayed also in state of alarm. If during alarm the conditions ends, e.g., if during a tolerance range alarm the actual value returns to within the tolerance range, the information icon disappears, whereas the alarm will continue until manual acknowledgement.

Press the flash icon next to the information icon to access the corresponding text information.



Normal display showing the text information.

The currently valid information texts are highlighted in black (example: “O2 pressure alarm off“)

Condition	Information icon	Text information	Start after condition occurred
The controller is in Idle mode (chap. 5.4).		“Idle mode”	immediately
Chamber door open		“Door open”	immediately
CO_2 pressure alarm deactivated		“CO2 pressure alarm off”	immediately
Chamber with O_2 control and optional alternative control range: O_2 pressure alarm deactivated		“O2 pressure alarm off”	immediately
Chamber with O_2 control: N_2 pressure alarm deactivated		“N2 pressure alarm off”	immediately
Interior socket (option) activated		“Interior socket”	immediately
Hot air sterilization running		“Sterilization”	immediately

Notifications are not shown in the event list.

11.1.2 Alarm messages

Condition	Alarm message	Start after condition occurred	Zero-voltage relay alarm output
Having reached the setpoint, the actual temperature value deviates by more than the set tolerance range value and longer than the set delay time from the setpoint ***or*** the temperature doesn't reach the tolerance range within 3 hours from turning on the chamber or closing the door.	"Temperature range"	After configurable delay time (chap. 11.5). Factory setting: 10 minutes	With alarm start
Having reached the setpoint, the actual CO_2 concentration deviates by more than the set tolerance range value and longer than the set delay time from the setpoint ***or*** the CO_2 concentration doesn't reach the tolerance range within 3 hours from turning on the chamber or closing the door	"CO2 range"	After configurable delay time (chap. 11.5). Factory setting: 10 minutes	With alarm start
Chamber with O_2 control: Having reached the setpoint, the actual O_2 concentration deviates by more than the set tolerance range value and longer than the set delay time from the setpoint ***or*** the O_2 concentration doesn't reach the tolerance range within 3 hours from turning on the chamber or closing the door	"O2 range"	After configurable delay time (chap. 11.5). Factory setting: 10 minutes	With alarm start
CBF / CBF-UL: Having reached the setpoint, the actual humidity value deviates by more than the set tolerance range value and longer than the set delay time from the setpoint ***or*** the humidity doesn't reach the tolerance range within 3 hours from turning on the chamber or closing the door.	"Humidity range"	After configurable delay time (chap. 11.5). Factory setting: 10 minutes	With alarm start
Chamber door is open for longer than the set delay time.	"Door open"	After configurable delay time (chap. 11.5). Factory setting: 1 minute	----
Power failure	---	----	immediately

Condition	Alarm message	Start after condition occurred	Zero-voltage relay alarm output
Exceeded setpoint of the safety controller class 3.1	“Safety controller	immediately	----
Low CO_2 outlet pressure (< 0.3 bar / *4.4 psi*)	“CO2 pressure”	immediately	----
Chamber with O_2 control: Low O_2 outlet pressure (< 0.3 bar / *4.4 psi*)	“O2 pressure”	immediately	----
Chamber with O_2 control: Low N_2 outlet pressure (< 0.3 bar / *4.4 psi*)	“N2 pressure”	immediately	----
Temperature sensor defective	e.g. “- - - - “ or “<-<-< “ or “>->->”	immediately	immediately
Safety controller temperature sensor defective	“Safety controller sensor”	immediately	immediately
Condensation on the CO_2 sensor head. Dry the filter cap (see chap. 22.6.4) *If after drying the message reappears:* CO_2 sensor may be defective. Contact BINDER Service.	“CO2 sensor not ready”	immediately	----
Condensation on the CO_2 sensor head for longer than 6 hours. Dry the filter cap (see chap. 22.6.4) *OR* CO_2 sensor defective. Contact BINDER Service.	“CO2 sensor fault”	immediately	immediately
Chamber with O_2 control: O_2 sensor defective. Contact BINDER Service	“O2 sensor fault”	immediately	immediately
CBF / CBF-UL: Humidity sensor defective. Contact BINDER Service	“Humid sensor fault”	immediately	immediately
Hot air sterilization running	“Sterilization”	immediately	----
CBF / CBF-UL: Humidity module defective. Contact BINDER Service.	“Humidity system”	immediately	immediately
CBF / CBF-UL: Humidity module cannot fill up. Possible causes: • Freshwater bag is empty or contains air • The silicon tube is not correctly inserted into the pump • Silicon tube kinked Humidification turns off. When the water supply is functional again, the humidity system restarts, or the chamber is defective.	“Freshwater supply”	immediately	immediately

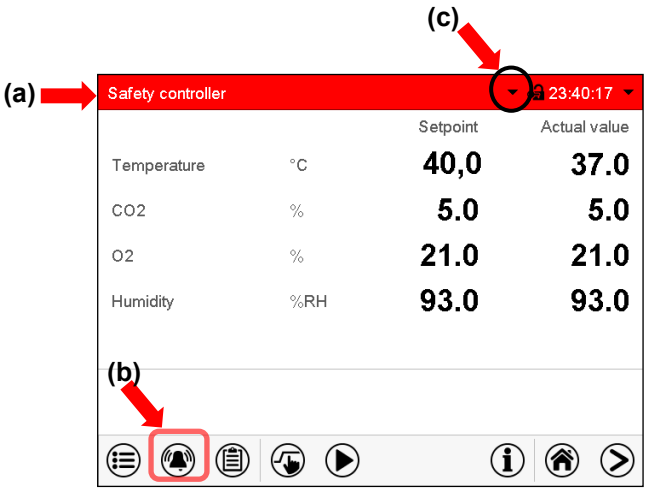
Alarm messages are displayed in the list of active alarms until acknowledging them. They are also shown in the event list.

	When operating the chamber without CO_2 / O_2 / N_2 connection, turn off the corresponding gas control in the “setpoints” menu (chap. 6.7) in order to avoid tolerance range and pressure alarms.

	CBF / CBF-UL: When operating the chamber without water supply, turn off humidity control in the “setpoints” menu (chap. 6.7) in order to avoid humidity alarms..

11.2 State of alarm

1. Visual indications in Normal display: alarm message, screen header flashing in red color
2. Audible alert, if the buzzer is enabled (chap. 11.4).
3. In some cases: Switching the zero-voltage relay alarm output (chap. 11.6) to transmit the alarm e.g., to a central monitoring system.



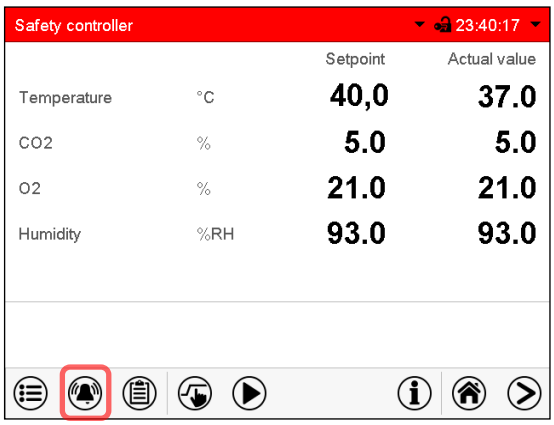
Normal display in state of alarm (example).

(a) Screen header flashing in red color and showing the alarm message

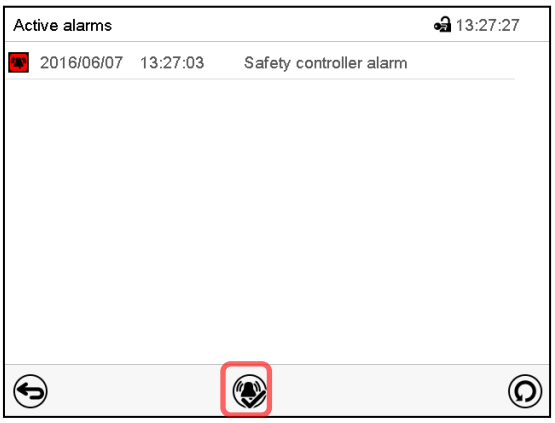
(b) ***Alarm*** icon on the bottom of the screen: change to the list of active alarms and alarm acknowledgement

(c) If applicable, information icon in the screen header. Indication of a certain condition

11.3 Resetting an alarm, list of active alarms



Normal display in state of alarm (example).
Press the ***Alarm*** icon



List of active alarms.
Press the ***Reset alarm*** icon.

Pressing the ***Reset alarm*** icon mutes the buzzer for all active alarms. The icon then disappears.

- Acknowledging while the alarm condition persists: Only the buzzer turns off. The visual alarm indication remains on the controller display. The alarm remains in the list of active alarms.

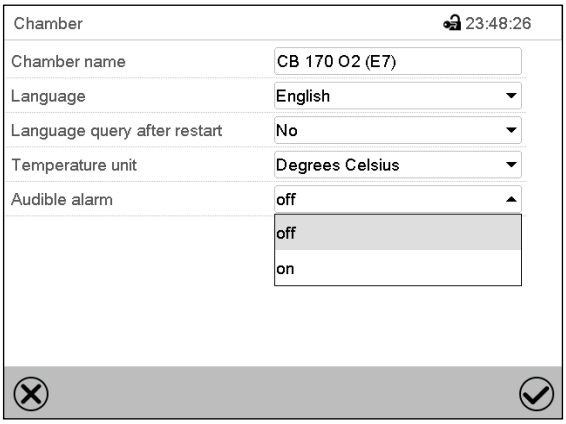
When the alarm condition has ended, the visual alarm indication is automatically cleared. The alarm is then no longer in the list of active alarms.

- Acknowledging after the alarm condition has ended: The buzzer and the visual alarm indication are reset together. The alarm is then no longer in the list of active alarms.
- The zero-voltage relay alarm output resets together with the alarm.

For appropriate actions in the event of an alarm, please refer to chap. 22.6 “Troubleshooting”.

11.4 Activating / deactivating the audible alarm (alarm buzzer)

Path: ***Main menu > Settings > Chamber***

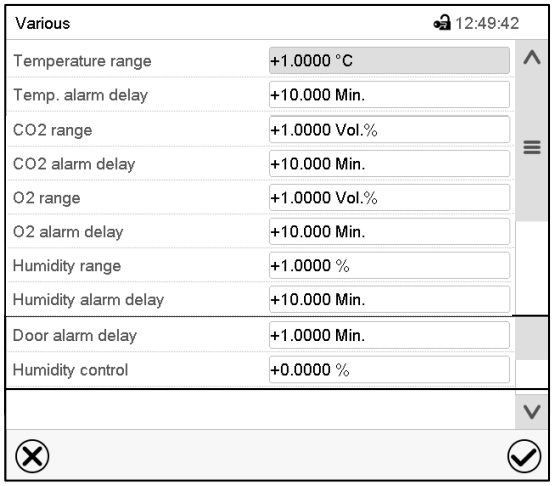


“Chamber” submenu (example).

In the field “Audible alarm” select the desired setting “off“ or “on” and press the ***Confirm*** icon.

11.5 Tolerance range settings and alarm delay times

Path: ***Main menu > Settings > Various***



Submenu “Various”.

Select the desired function.

In this menu you can set the deviation between the actual value and setpoint for temperature, CO_2, O_2 (chamber with O_2 control) and humidity (CBF / CBF-UL) which that shall cause a tolerance range alarm, and you can define the delay time after which the tolerance alarm will be triggered.

Also you can set the delay time after opening the door will trigger an alarm.

The entered value defines the tolerance range around the setpoint value. Example: Temperature setpoint: 37 °C, tolerance range value: +/- 2 °C, i.e. this defines a tolerance range from 35 °C up to 39 °C.

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

Alarms following deviations from the tolerance range or door opening

If the actual value, after having reached the setpoint, deviates by more than the set tolerance range value and longer than 10 min. from the setpoint ***or*** the temperature doesn't reach the tolerance range within 3 hours from turning on the chamber or closing the door, after the configured interval (e.g., "Temp range alarm delay") an alarm is triggered. It is visually indicated in Normal display. If the alarm buzzer is activated (chap. 11.4) there is an audible alert. The zero-voltage relay alarm output (chap. 11.6) switches to transmit the alarm. The alarm is shown in the list of active alarms (chap. 11.3).

Alarm message	Start after condition occurred
"Temperature range"	after configurable time
"CO2 range"	after configurable time
"O2 range"	after configurable time
"Humidity range"	after configurable time
"Door open"	after configurable time

If the condition (deviation from the tolerance range or door opening) ends within the configured alarm delay time, no alarm will be triggered after the delay time.

☞	When operating the chamber with deactivated CO_2, O_2 (chamber with O_2 control) or humidity (CBF / CBF-UL) control (chap. 6.7), the corresponding tolerance range alarms will not occur.

Setting:

- Select the field "Temperature range" and enter the desired value for the temperature range. Setting range: 1 °C to 10 °C. Confirm entry with ***Confirm*** icon.
- Select the field "Temp alarm delay" and enter the time in minutes, after which the range alarm shall be triggered. Setting range: 1 min to 120 min. Confirm entry with Confirm icon.
- Select the field "CO2 range" and enter the desired value for the CO_2 range. Setting range: 1 vol.-% to 10 vol.-%. Confirm entry with ***Confirm*** icon.
- Select the field "CO2 alarm delay" and enter the time in minutes, after which the range alarm shall be triggered. Setting range: 1 min to 120 min. Confirm entry with Confirm icon.
- Select the field "O2 range" and enter the desired value for the O_2 range. Setting range: 1 vol.-% to 10 vol.-%. Confirm entry with ***Confirm*** icon.
- Select the field "O2 alarm delay" and enter the time in minutes, after which the range alarm shall be triggered. Setting range: 1 min to 120 min. Confirm entry with Confirm icon.
- Select the field "Humidity range" and enter the desired value for the humidity range. Setting range: 5% r.h. to 20% r.h. Confirm entry with ***Confirm*** icon.
- Select the field "Humid alarm delay" and enter the time in minutes, after which the range alarm shall be triggered. Setting range: 1 min to 120 min. Confirm entry with Confirm icon.
- Select the field "Door alarm delay" and enter the time in minutes, after which the range alarm shall be triggered. Setting range: 1 min to 120 min. Confirm entry with Confirm icon.

After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu, **or** press the ***Close*** icon to exit the menu without taking over the entries.

11.6 Zero-voltage relay alarm output

The chamber is equipped with a zero-voltage relay output which permits the transmission of some alarm messages to a central monitoring system.

The connection is realized as a DIN socket (3) on the chamber rear. A suitable DIN plug is enclosed.

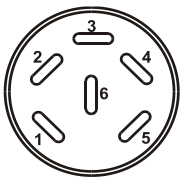
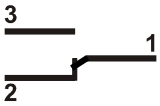


Figure 42: Pin configuration of the DIN socket (3) on the chamber rear



ALARM

Pin 1: Pole, Pin 2: Break relay, Pin 3: Make contact

In case there is no alarm, contact 1 closes with contact 3.

Closing contact 1 with contact 2 switches the zero-voltage relay alarm output.

Maximum loading capacity of the switching contacts: 24V AC/DC – 2.5A

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 – 2.5A.

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

The zero-voltage relay alarm output switches at the following events:

Alarm message	Condition	Switching the alarm contact
---	Power failure	immediately
“Temperature range”	Temperature tolerance range alarm (see chap. 11.1.2)	After configurable delay time (chap. 11.5). Factory setting: 10 minutes
“CO2 range”	CO_2 tolerance range alarm (see chap. 11.1.2)	After configurable delay time (chap. 11.5). Factory setting: 10 minutes
“O2 range”	O_2 tolerance range alarm (chamber with O_2 control) (see chap. 11.1.2)	After configurable delay time (chap. 11.5). Factory setting: 10 minutes
CBF / CBF-UL: “Humidity range”	Humidity tolerance range alarm (see chap. 11.1.2)	After configurable delay time (chap. 11.5). Factory setting: 10 minutes
“Door open”	Chamber door open alarm (see chap. 11.1.2)	After configurable delay time (chap. 11.5). Factory setting: 1 minutes
CBF / CBF-UL: “Humidity system”	The humidity module is defective (see chap. 11.1.2)	immediately
CBF / CBF-UL: “Freshwater supply”	The humidity module cannot fill up (see chap. 11.1.2)	immediately

In case of a tolerance range alarm or a door open alarm, the alarm message on the controller display remains on during the alarm transmission via the zero-voltage relay outputs.

As soon as the cause of the alarm is identified and resolved, you can reset the alarm transmission via the zero-voltage relay outputs together with the alarm message in the “Active alarms” menu by pressing the ***Reset alarm*** icon.

In case of a power failure, transmission of the alarm via zero-voltage relay outputs remains active for the duration of the power failure. After power returns, contact 1 closes automatically with contact 3.

	When using the APT-COM™ 4 Multi Management Software (option, chap. 18.1) for data acquisition, the alarm messages are only recorded in the protocol. ➢ Set the tolerance limits for limit alarms by APT-COM™ 4 separately in the AlarmCenter.

12. Temperature safety devices

12.1 Over temperature protective device (class 1)

The chamber is equipped with an internal temperature safety device, class 1 acc. to DIN 12880:2007. It serves to protect the chamber and prevents dangerous conditions caused by major defects.

If the actual temperature exceeds the nominal temperature by approx. 10 °C, the over temperature protective device permanently turns off the chamber. The user cannot restart the device again. The protective cut-off device is located internally. Only a service specialist can replace it. Therefore, please contact an authorized service provider or BINDER Service.

12.2 Overtemperature safety controller class 3.1

The chambers are regularly equipped with an electronic overtemperature safety controller (temperature safety device class 3.1 according to DIN 12880:2007). The safety controller is functionally and electrically 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 set-point. This condition (state of alarm) is indicated visually and additionally with an audible alert if the buzzer is enabled (chap. 11.4). The alarm persists until the chamber cools down below the configured safety controller setpoint.

	Check the setting regularly and adjust it following changes of the set-point or charge.

	During a running sterilization (chap. 21.3) the safety controller is non-functional

12.2.1 Safety controller modes

You can select between “Limit (absolute)” and “Offset (relative)” safety controller mode

- **Limit:** 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 set-point 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:** Maximum overtemperature above any active temperature set point. The maximum temperature changes internally and automatically with every set-point change.

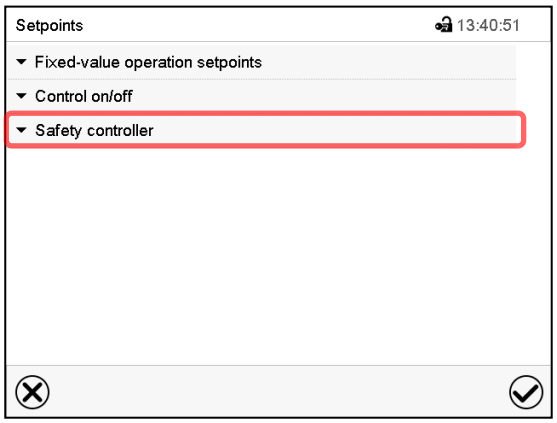
  This setting is recommended for program operation. It is important to check the safety controller set-point and safety controller mode occasionally, as it does not offer a fix, independent limit temperature value, which would never be exceeded.

Example: Desired temperature value: 37 °C, desired safety controller value: 39 °C.
Possible settings for this example:

Temperature set point	Safety controller mode	Safety controller set-point
37 °C	Limit (absolute)	39 °C
	Offset (relative)	2 °C

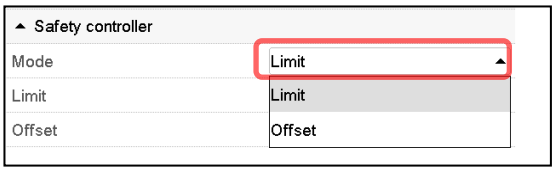
12.2.2 Setting the safety controller

	Press the ***Setpoint setting*** icon to access the “Setpoint” setting menu from Normal display.



“Setpoints” menu.
Select the field “Safety controller” to access the settings.

- In the field “Mode” select the desired setting “Limit” or “Offset”.



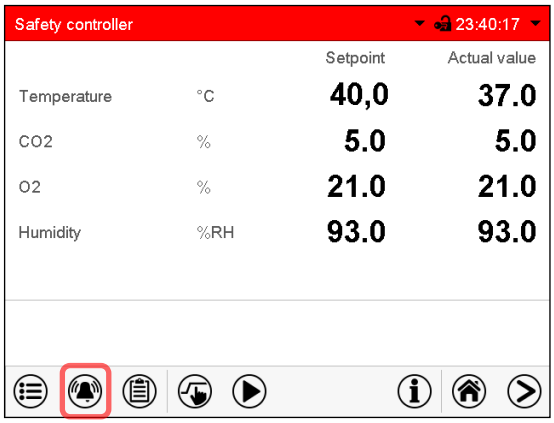
- Select the corresponding field “Limit” or “Offset” according to the selected mode and enter the desired safety controller setpoint. Confirm entry with Confirm icon.

	Regularly check the safety controller setting for set-point type “Limit” or “Offset” • in Fixed value operating mode according to the entered set-point temperature value • in program mode according to the highest temperature value of the selected temperature program Set the safety controller set-point by approx. 2 °C above the desired temperature set-point.

After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu, **or** press the ***Close*** icon to exit the menu without taking over the entries.

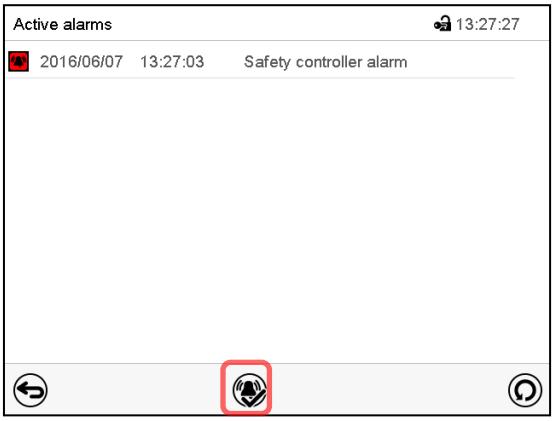
12.2.3 Message and measures in the state of alarm

The state of alarm is indicated visually in Normal display by the alarm message “Safety controller alarm” and the screen header flashing in red color. If the buzzer is enabled (chap. 11.4) there is an additional audible alert (chap. 11.2). The alarm remains active until it is acknowledged on the controller and the inner temperature falls below the set safety controller setpoint. Then the heating is released again.



Normal display with safety controller alarm.

Press the ***Alarm*** icon



List of active alarms.

Press the ***Reset alarm*** icon.

12.2.4 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. User management

13.1 Authorization levels and password protection

The available functions depend on the current authorization level “Master”, “Service”, “Admin” or “User”.

The authorization levels are hierarchical: Every authorization includes all functions of the next lower level.

“Master” authorization level

- Highest authorization level, only for developers
- Extensive authorization for controller operation and configuration, outputs/inputs, alarm settings, parameter sets and operating ring display
- All passwords can be changed in the “log out” submenu (chap. 13.3).

“Service” authorization level

- Authorization level only for BINDER service
- Extensive authorization for controller operation and configuration, access to service data
- The passwords for “Service”, “Admin” and “User” authorization levels can be changed in the “log out” submenu (chap. 13.3).

“Admin” authorization level

- Expert authorization level, for the administrator
- Authorization for controller configuration and network settings and for operating those controller functions required for operating the chamber. Restricted access to service data.
- Password (factory setting): “2”.
- The passwords for “Admin” and “User” authorization levels can be changed in the “log out” submenu (chap. 13.3).

“User” authorization level

- Standard authorization level for the chamber operator
- Authorization for operating the controller functions required for operating the chamber.
- No authorization for controller configuration and network settings. The “Settings” and “Service” submenus of the main menu are not available.
- Password (factory setting): “1”
- The password for the “User” authorization level can be changed in the “log out” submenu (chap. 13.3).

As soon as a password has been assigned for an authorization level, the access to this level and the related controller functions are only available after log-in with the appropriate password.

If for an authorization level no password is assigned, the related controller functions of this level are available for every user without login.

If passwords have been assigned for all authorization levels, access to the controller functions is locked without login.

Operation after user login

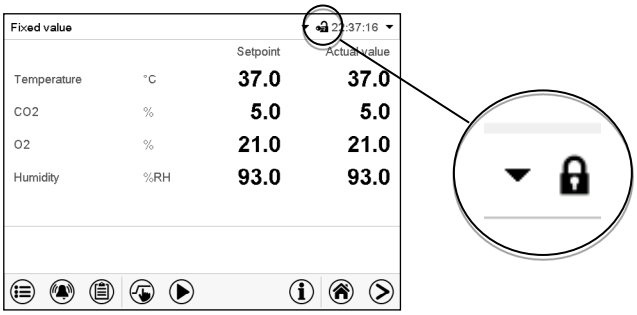
At user login, the authorization level is selected and confirmed by entering the respective password.

Following user login, controller operation is available, recognizable by the open-lock icon in the header. The available controller functions correspond to the user's authorization level.

Password protection activated for all levels: operation without user login is locked

If passwords have been assigned for all authorization levels, the controller is locked without registration of a user.

As long as no user is registered, controller operation is locked, recognizable at the closed-lock icon in the header. This requires that the user management has been activated by the assignment of passwords for the individual authorization levels.



Password protection for at least one level deactivated: operation without user login is possible

If passwords have not been assigned for all authorization levels, after turning on the chamber there are those controller functions available, which correspond to the highest authorization level without password protection.

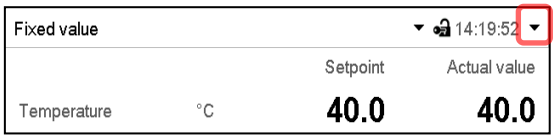
No lock icon is shown in the display header.

User login is neither required nor possible.

To activate the password protection and user login, perform new password assignment (chap. 13.5.3).

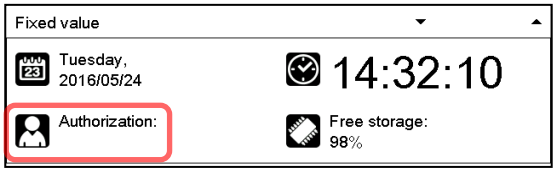
Information window

To check the authorization level of the user currently logged-in, select in Normal display the arrow far right in the display header.



The information window shows date and time, the controller's free memory space and under "Authorization" the authorization level of the current user.

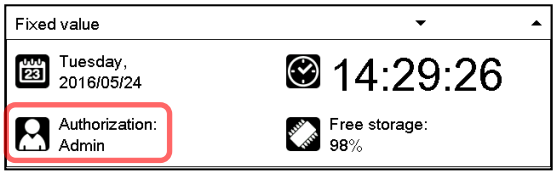
If passwords have been assigned for all authorization levels, a user without login (password entry) has no authorization. There are only viewing functions available.



Display when all authorization levels are password protected and no user has logged in:

No authorization level is displayed.

If passwords have been assigned only for some of the authorization levels, a user without login (password entry) has access to the functions of the highest authorization level without password protection.

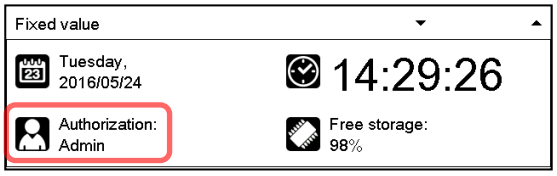


Display when only some of the authorization levels are password protected (example: no protection for the "User" and "Admin" levels) and no user has logged in:

The user's effective authorization (due to lack of password protection) is shown.

Example: user with "Admin" authorization.

If passwords have been assigned for some or all of the authorization levels, user login (password entry) provides the authorization for the corresponding password-protected level.



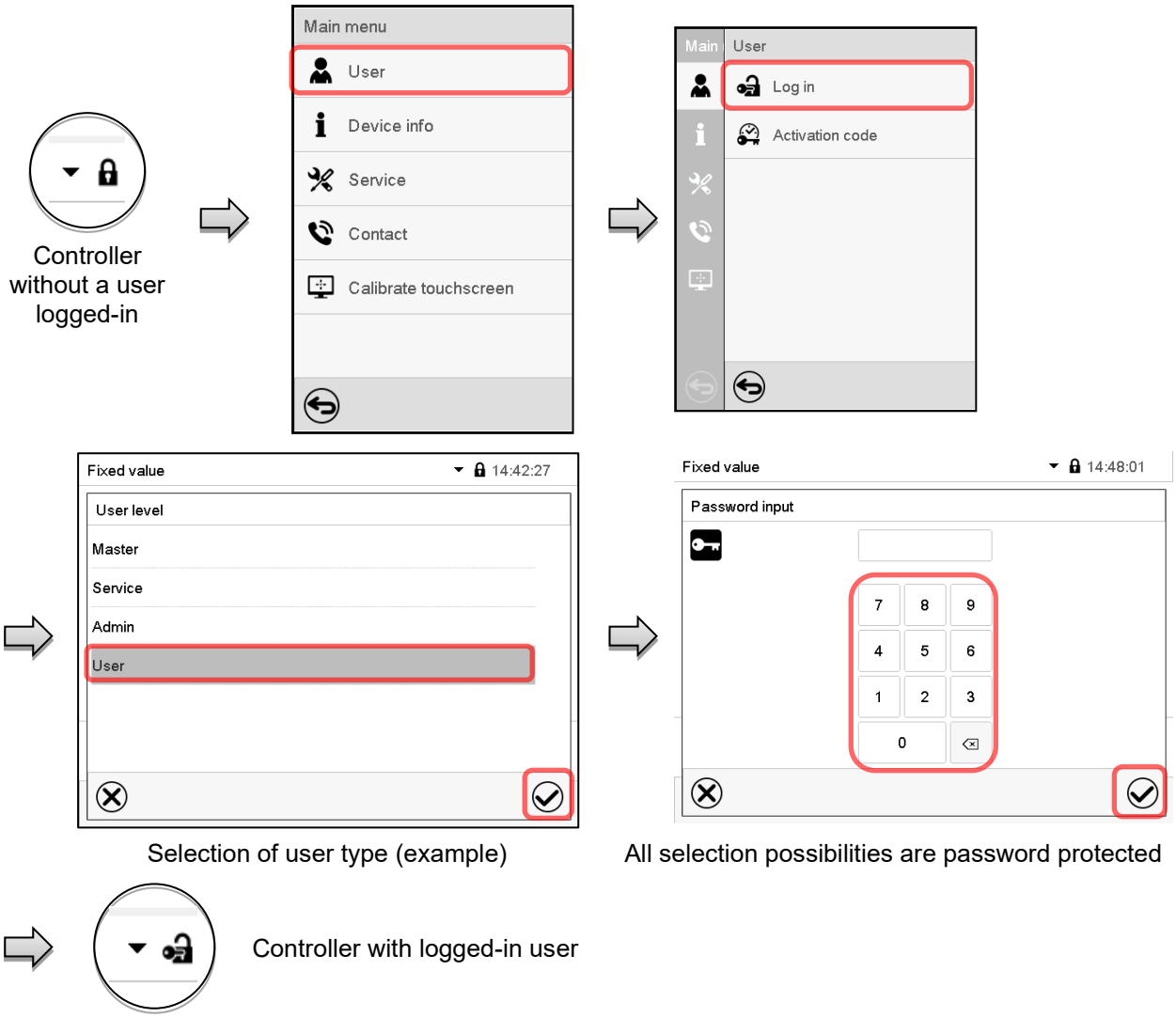
Display when at least some of the authorization levels are password protected and a user has logged in.

The user's authorization (by password entry) is shown.

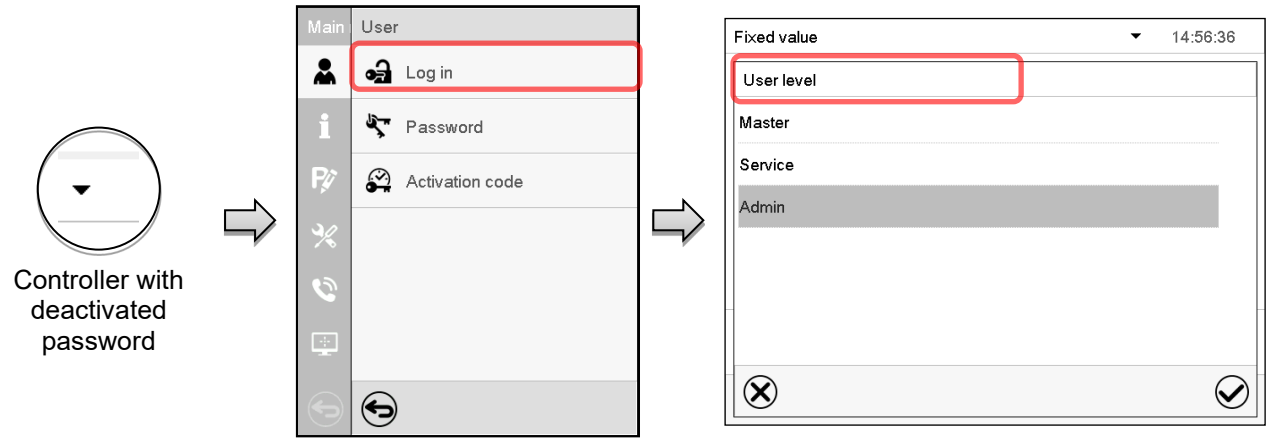
Example: user with "Admin" authorization.

13.2 Log in

Path: ***Main menu > User > Log in***



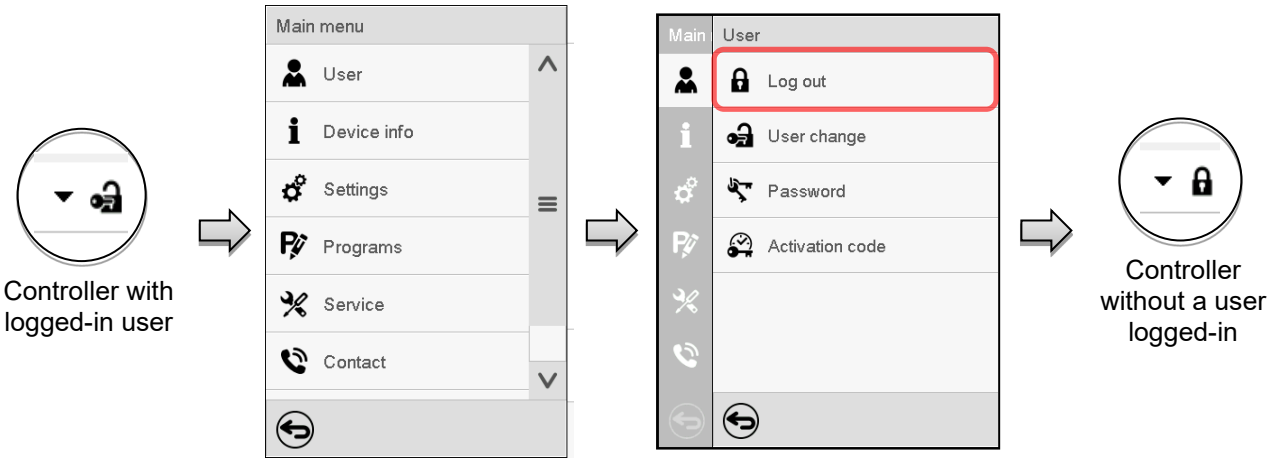
After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu, **or** press the ***Close*** icon to exit the menu without taking over the entries.



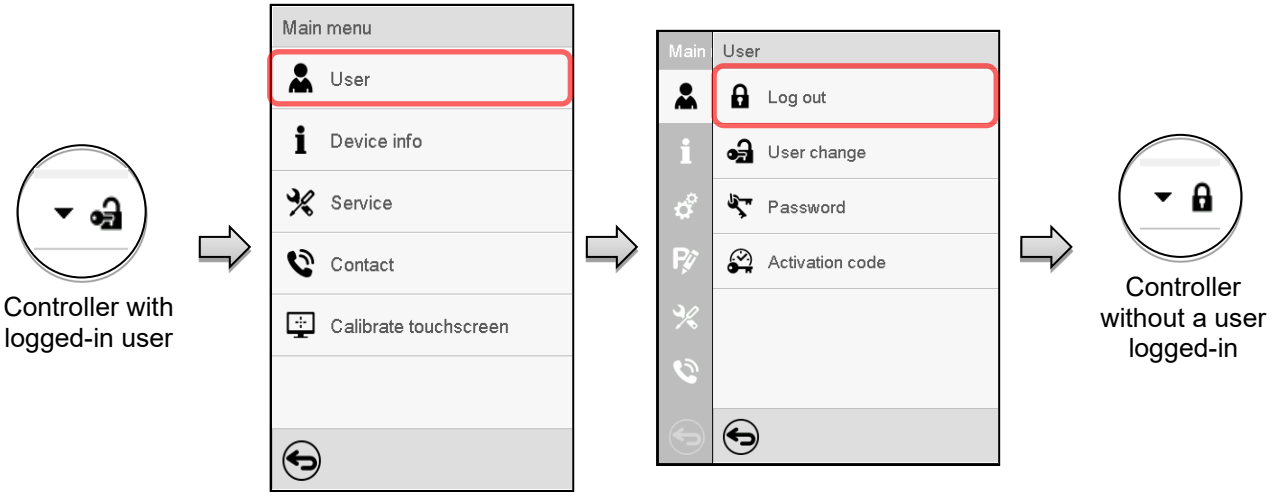
13.3 Log out

Path: ***Main menu > User > Log out***

User logoff with “Admin” authorization



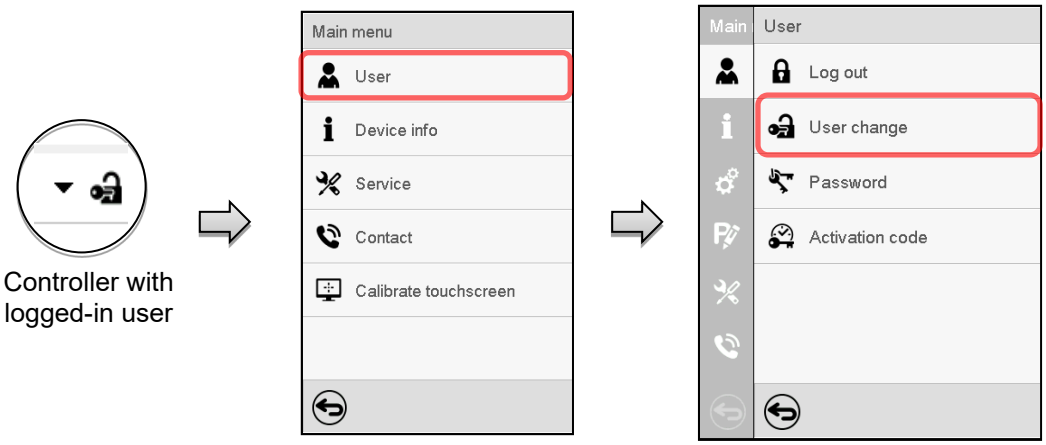
User logoff with “Admin” authorization

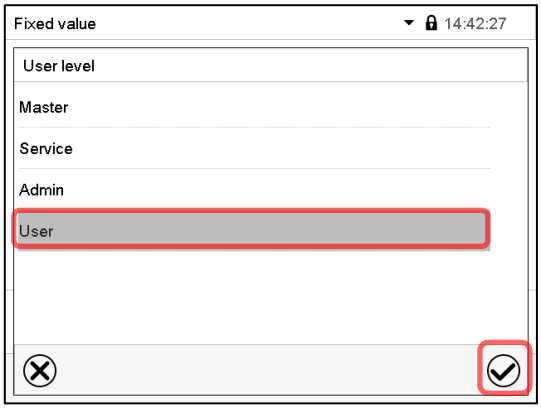


13.4 User change

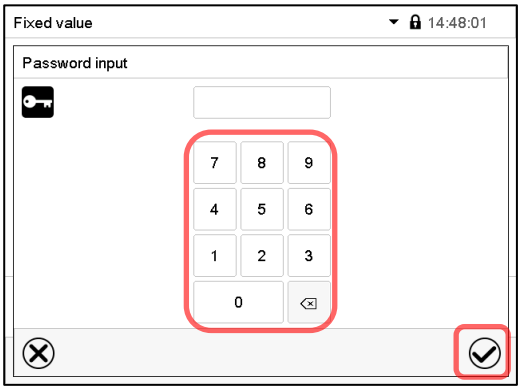
If the password function has been deactivated (chap.13.5.2) this function is not available.

Path: ***Main menu > User > User change***





User selection (example)



All selection possibilities are password protected

Controller with logged-in user

13.5 Password assignment and password change

This function is not available for a user logged-in with “User” authorization.

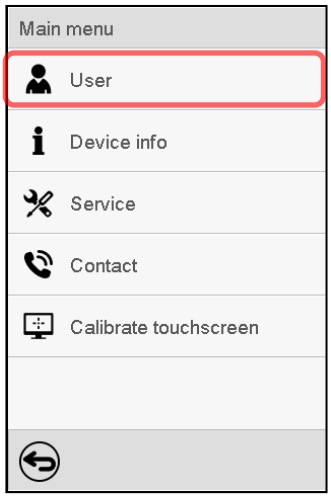
13.5.1 Password change

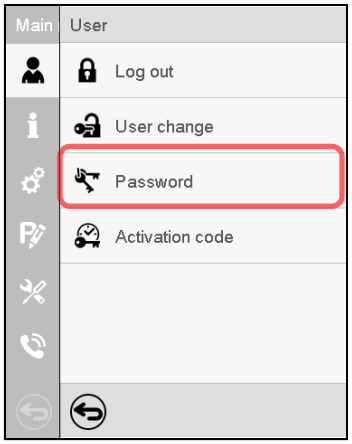
A logged-in user can change the passwords of his current level and of the next lower level(s).

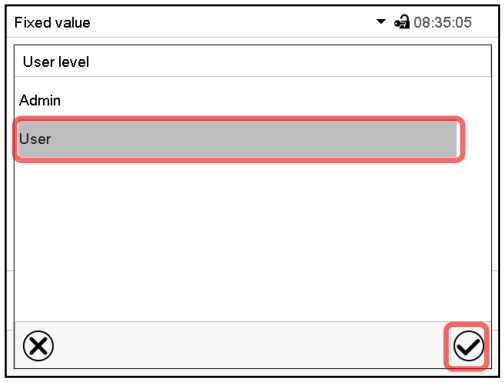
Example: A user with “Admin” authorization can change the passwords for the “Admin” and “User” authorization levels.

Path: ***Main menu > User > Password***

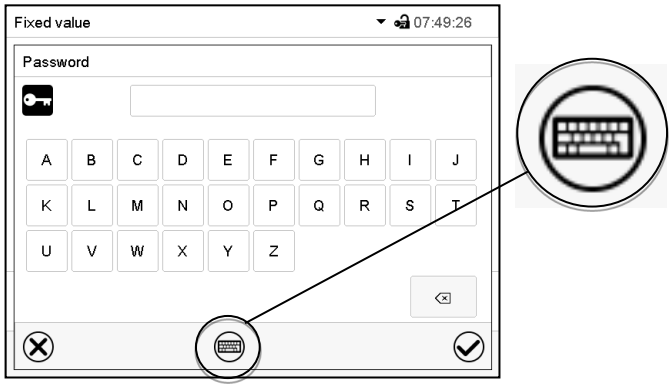
User logged-in with “Service” or “Admin” authorization







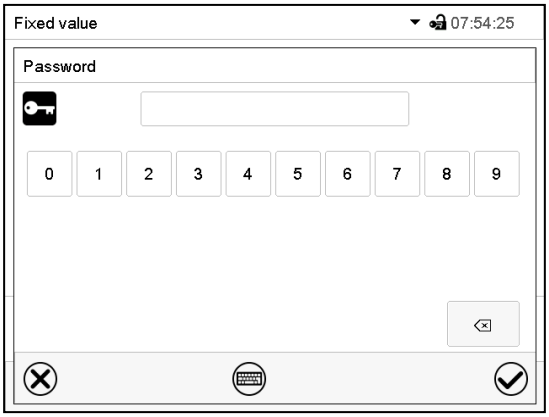
Selection of the authorization level (example: view with “Admin” authorization)



Enter desired password. If desired, press the ***Change keyboard*** icon to access other entry windows.

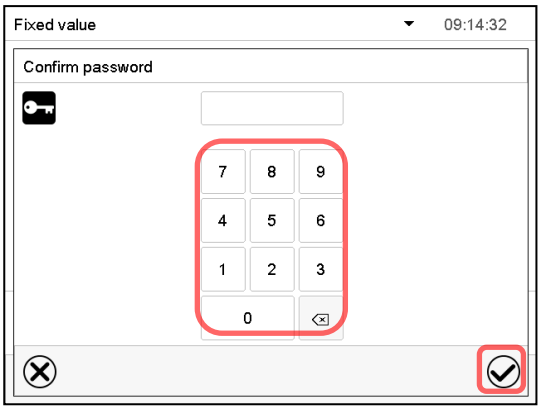
In the “Keyboard switch” window you can select different keyboards to enter uppercase and lowercase letters, digits, and special characters. All types of characters can be combined within one single password.

Example: access the digit entry window



Entry of digits

To confirm the entry, press the ***Confirm*** icon.



Repeat the password entry for confirmation (sample picture). For each character of the password, the required keyboard appears automatically.

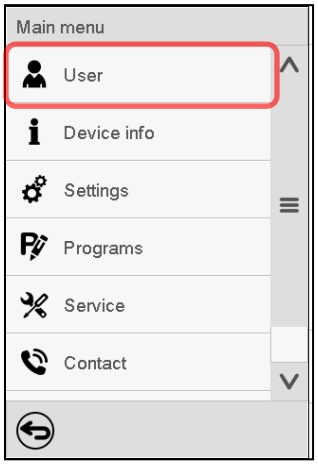
Then press the ***Confirm*** icon.

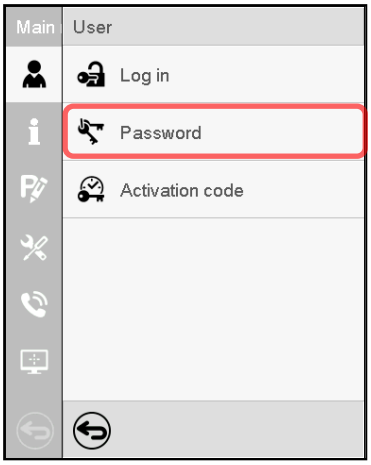
13.5.2 Deleting the password for an individual authorization level

A user logged-in with “Service” or “Admin” authorization can delete the passwords of his current level and of the next lower level(s). To do this no password is entered during a password change.

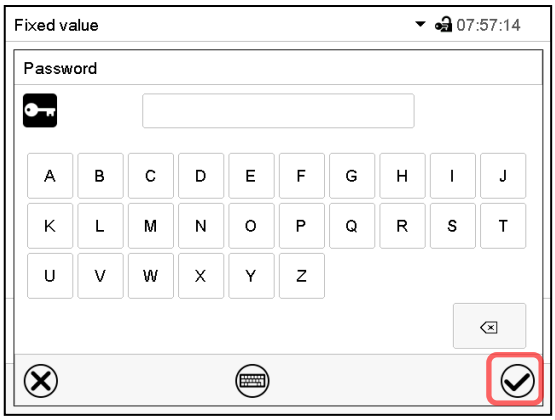
Path: ***Main menu > User > Password***

Controller with logged-in user (e.g. with “Admin” authorization)

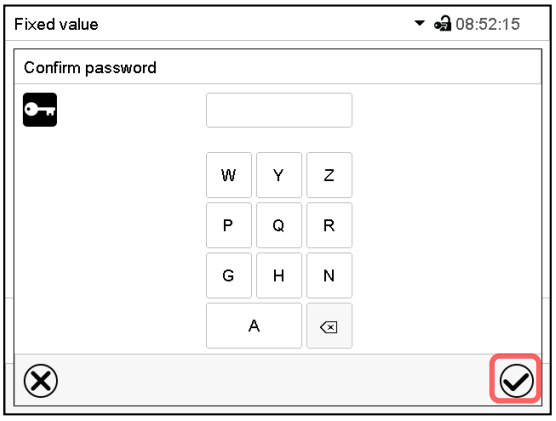




Select the authorization level for which the password shall be deleted.



Do NOT enter anything in the “Password” screen. Press the ***Confirm*** icon.



Do NOT enter anything in the “Confirm password” screen. Press the ***Confirm*** icon.

The password is deleted.

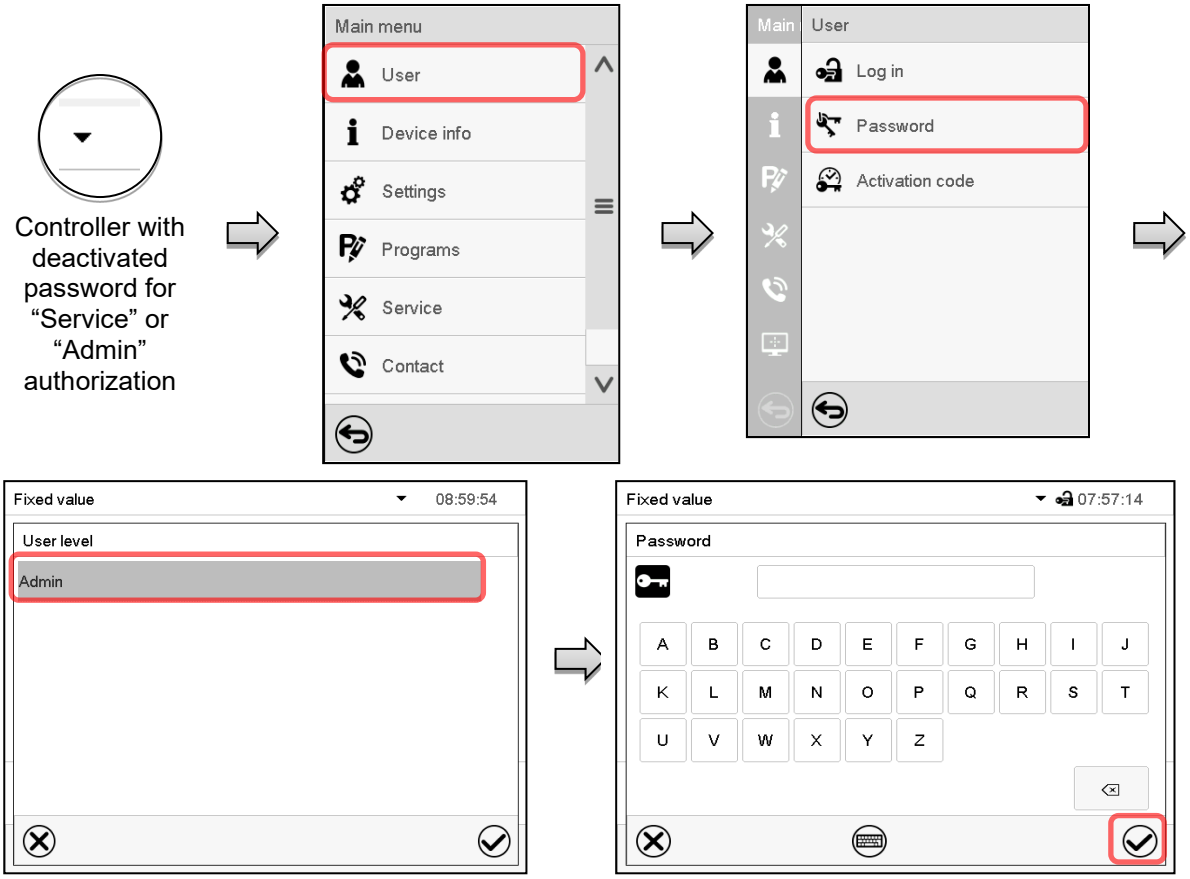
13.5.3 New password assignment for “service” or “admin” authorization level when the password function was deactivated

If the password protection for an authorization level has been deactivated, i.e., no password is assigned, no login for this level is possible. Therefore access to this authorization level is available without login.

If the password for the “Service” or “Admin” authorization has been deleted (chap. 13.5.2), a new password can be assigned for the current level and the next lower level(s) without user login.

Example: The password for the “Admin” authorization level was deleted, therefore every user without login has full access to the functions of the “Admin” authorization level. If access to this level shall become password protected again, the user can assign a new password for the “Admin” authorization level with the “Password” function.

Path: ***Main menu > User > Password***



Select the authorization level, for which you want to assign a password.

(Example: “Admin” authorization)

Enter the desired password. If desired, press the ***Change keyboard*** icon to access other entry windows.

To confirm the entry, press the ***Confirm*** icon.

Repeat the password entry for confirmation. For each character of the password, the required keyboard appears automatically. Then press the ***Confirm*** icon.

13.6 Activation code

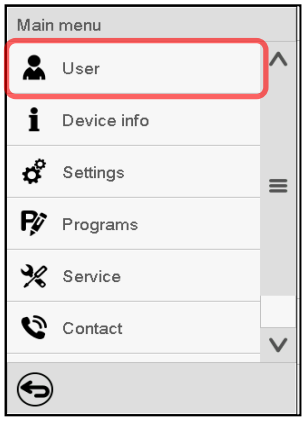
Certain functions of the controller can be unlocked with a previously generated activation code.

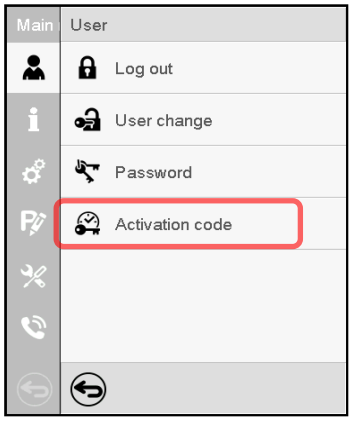
The activation code enables access to functions available only in the “Service” authorization level by users without a “Service” authorization. Such functions include e.g., adjustment or extended configurations.

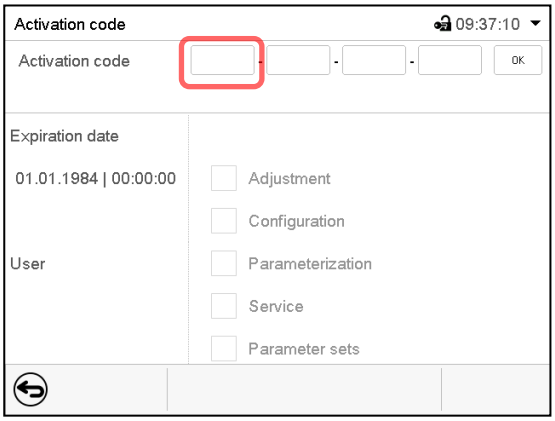
The activation code is available in authorization levels.

Path: ***Main menu > User> Activation code***

Controller with logged-in user

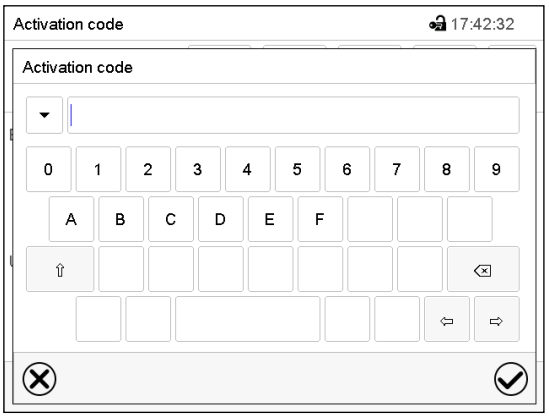






Activation code menu.

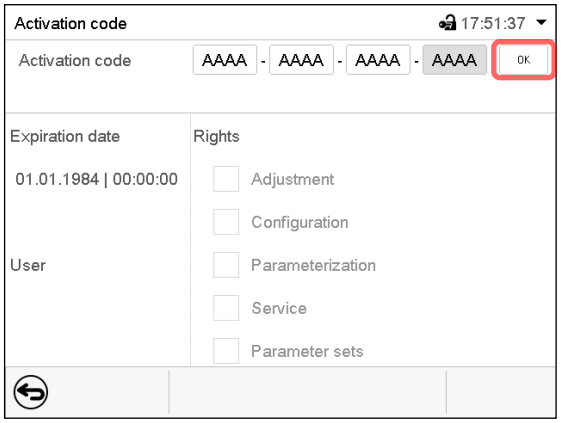
Select the first of the four entry fields.



Activation code entry window.

Enter the first four characters of the activation code and press the ***Confirm*** icon.

Select the next of the four entry fields and proceed accordingly until the entire code has been entered.

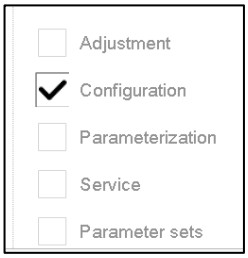


“Activation code” menu with entered code (sample view).

Press ***OK*** to take over the entry.

The available functions are indicated by marked checkboxes.

Example: Extended configurations available.



Under “Expiration date” the date of expiry of the code is displayed.

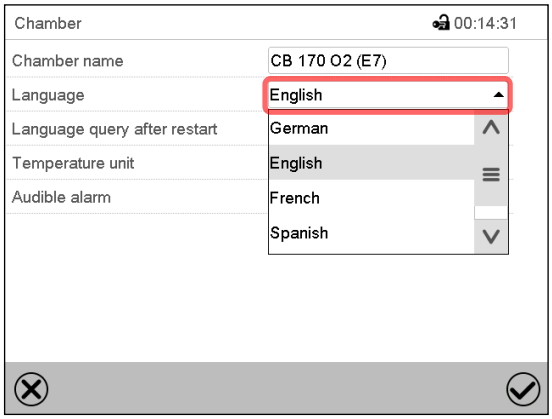
14. General controller settings

Most of 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.

14.1 Selecting the controller’s menu language

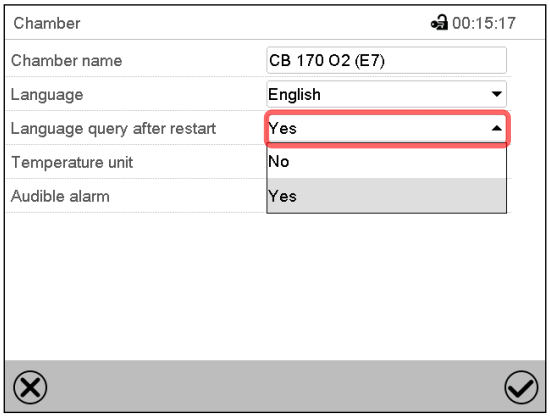
The MB2 program controller communicates by a menu guide using real words in German, English, French, Spanish, and Italian.

Path: ***Main menu > Settings > Chamber***



“Chamber” submenu.

Select the desired language.



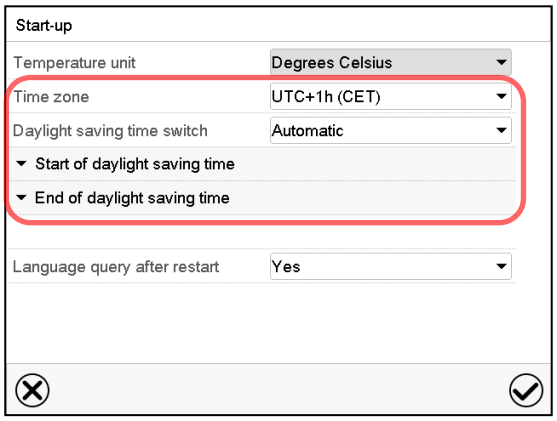
“Chamber” submenu.

Select if there shall be a language query after restarting the chamber and press the ***Confirm*** icon.

Return to Normal display with the ***Back*** icon to take over the entries.

14.2 Setting date and time

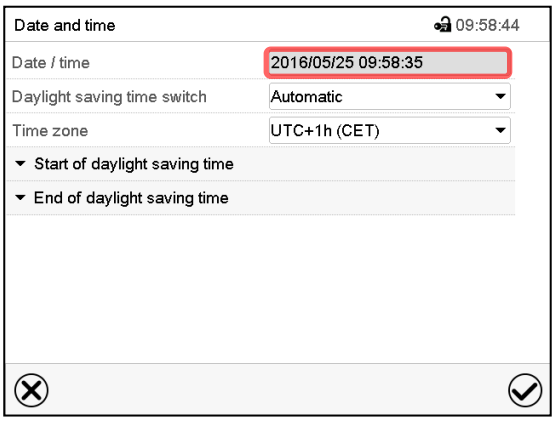
Following start-up of the chamber after language selection:



Select the time zone and configure the daylight saving time switch.

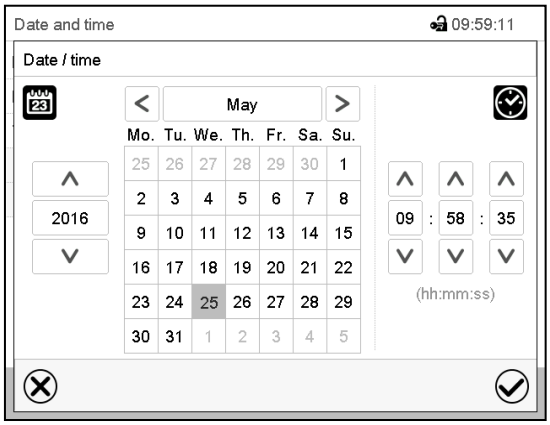
Or later:

Path: ***Main menu > Settings > Date and time***



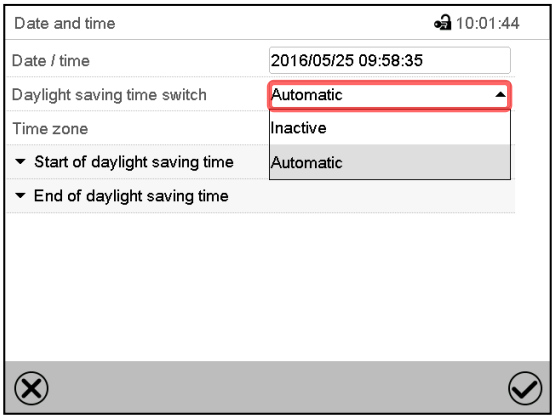
“Date and time” submenu.

Select the field “Date / time”.



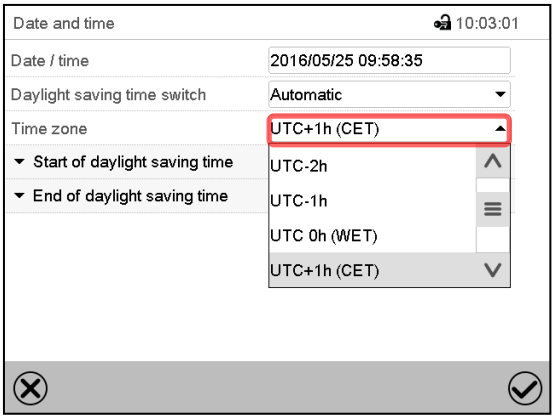
“Date / time” entry menu.

Enter date and time and press the ***Confirm*** icon.



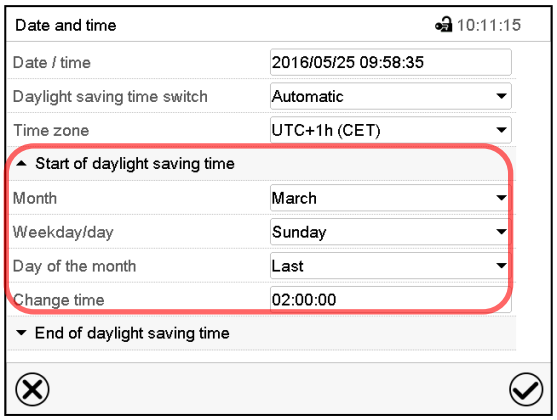
“Date and time” submenu.

In the field “Daylight saving time switch” select the desired setting “Automatic” or “Inactive”.



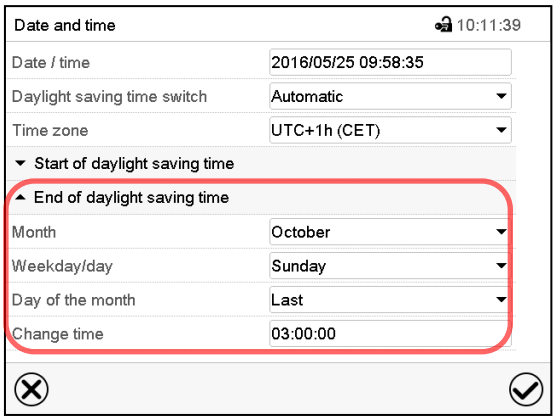
“Date and time” submenu.

Select the desired time zone and press the ***Confirm*** icon.



“Date and time” submenu.

Select the desired start of the daylight saving time.



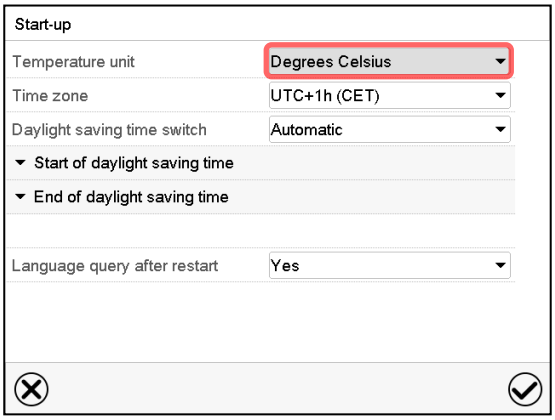
“Date and time” submenu.

Select the desired end of the daylight saving time and press the ***Confirm*** icon.

After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu, **or** press the ***Close*** icon to exit the menu without taking over the entries.

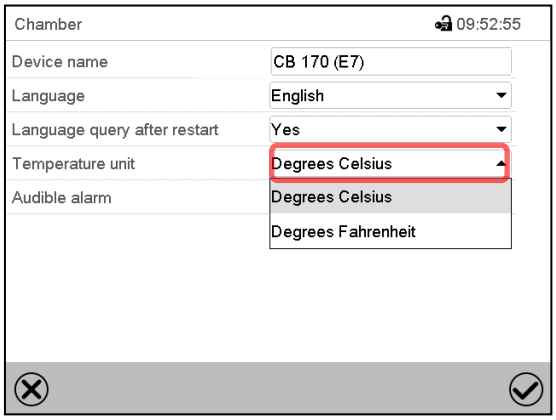
14.3 Selecting the temperature unit

Following start-up of the chamber:



Or later:

Path: ***Main menu > Settings > Chamber***



Select the desired temperature unit and press the ***Confirm*** icon.

Change of the temperature unit between °C and °F.

If the unit is changed, all values are converted accordingly

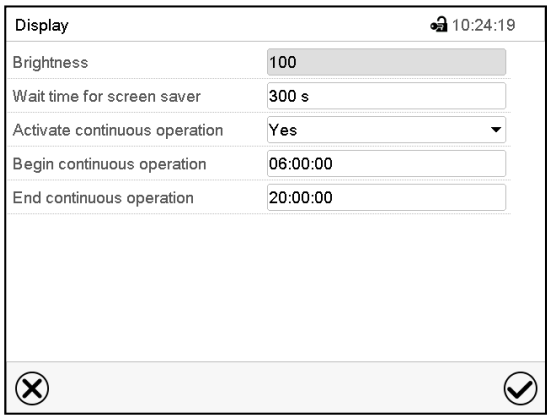
	C = degree Celsius	0 °C = 31°F	Conversion:
	F= degree Fahrenheit	100 °C = 212°F	[value in °F] = [value in °C] ∗ 1,8 + 32

14.4 Display configuration

14.4.1 Adapting the display parameters

This function serves to configure parameters like display brightness and operating times.

Path: ***Main menu > Settings > Display > Display***



“Display” submenu.

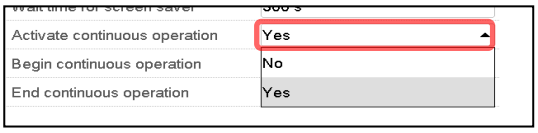
- Select the field “Brightness”.

  Move the grey slide to the left or right to define the brightness of the display

  - left = darker (minimum value: 0)
  - right = brighter (maximum value: 100)

  Press the ***Confirm*** icon.

- Select the field “Wait time for screen saver” and enter the desired waiting time for the screen saver in seconds. Setting range: 10 sec up to 32767 sec. During the waiting time the display is off. Confirm entry with Confirm icon.
- In the field “Activate continuous operation” select the desired setting “Yes” or “No”.



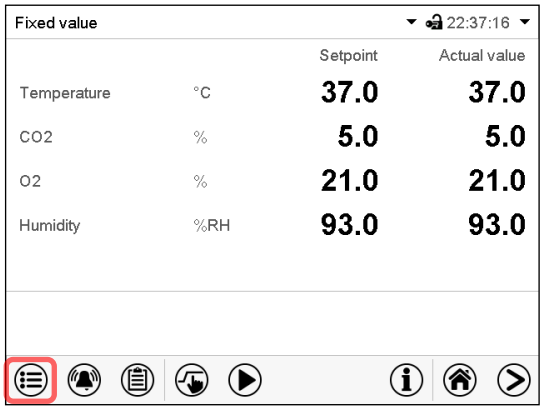
- Select the field “Begin continuous operation” (possible only if continuous operation is activated) and enter the time with the arrow keys. Confirm entry with Confirm icon.
- Select the field “End continuous operation. (only possible if continuous operation is activated) and enter the time with the arrow keys. Confirm entry with ***Confirm*** icon.

After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu, **or** press the ***Close*** icon to exit the menu without taking over the entries.

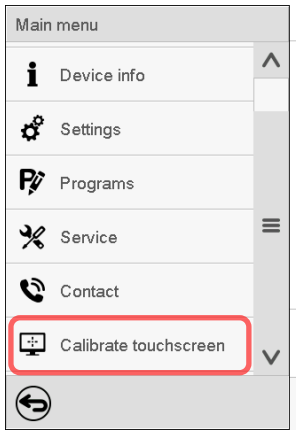
14.4.2 Touchscreen calibration

This function serves to optimize the display for the user’s individual angular perspective.

Path: ***Main menu > Calibrate touchscreen***



Normal display.



Select “Calibrate touchscreen” and follow the instructions on the display.

You need to touch all four corners of the touchscreen to calibrate it. Appropriate boxes appear successively in each corner.

	The waiting icon shows how much time there is left to touch the currently activated box. If the box is not touched withing this period, calibration is aborted and the display changes to Normal display.

After completing the calibration, i.e., touching all four boxes, the display changes to Normal display.

14.5 Network and communication

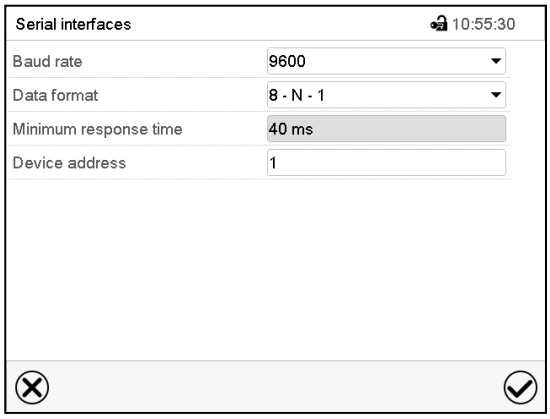
For these settings at least the “Admin” authorization level is required.

14.5.1 Serial RS485 interface (available via BINDER INDIVIDUAL Customized Solutions)

This menu allows to configure the communication parameters of the RS485 interface.

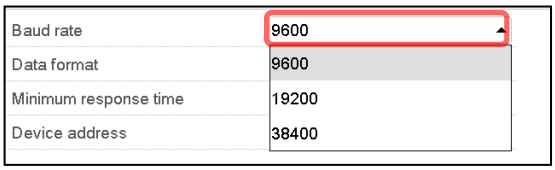
The device address is required to recognize chambers with this interface type in a network, e.g. when connecting it to the optional BINDER APT-COM™ 4 Multi Management Software (chap. 18.1). In this case do not change the other parameters.

Path: ***Main menu > Settings > Serial interfaces***

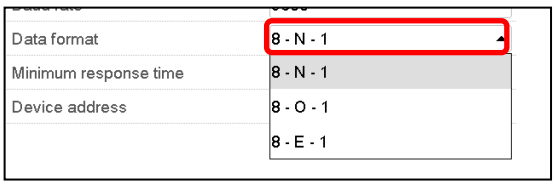


“Serial interfaces” submenu.

- Select the desired setting in the field “Baud rate”.



- Select the desired setting in the field “Data format”.



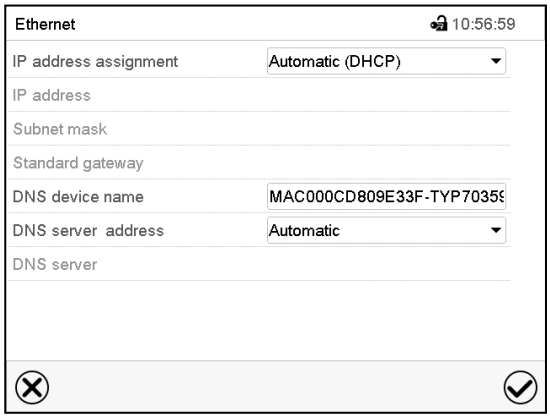
- Select the field “Minimum response time” and enter the desired minimum response time. Confirm entry with Confirm icon.
- Select the field “Device address” and enter the device adress. Factory setting is “1”. Confirm entry with ***Confirm*** icon.

After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu, **or** press the ***Close*** icon to exit the menu without taking over the entries.

14.5.2 Ethernet

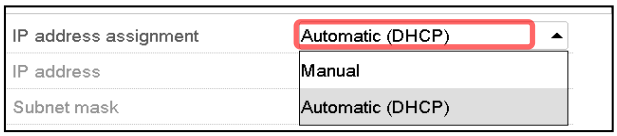
14.5.2.1 Configuration

Path: ***Main menu > Settings > Ethernet***

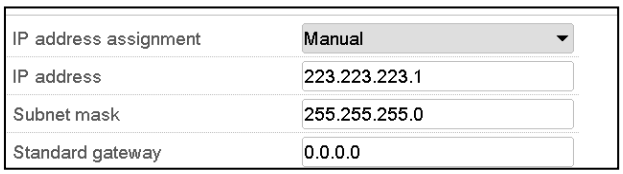


"Ethernet" submenu.

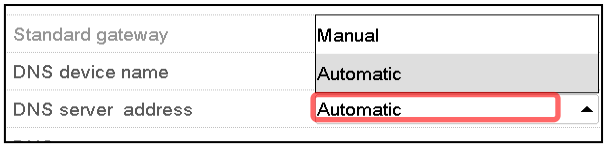
- In the field "IP address assignment" select the desired setting "Automatic (DHCP)" or "Manual".



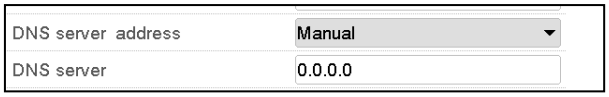
  With selection "Manual" you can enter the IP-address, the subnet mask and the standard gateway manually.



- Select "DNS device name" and enter the DNS device name. Confirm entry with Confirm icon.
- In the field "DNS server address" select the desired setting "Automatic" or "Manual".



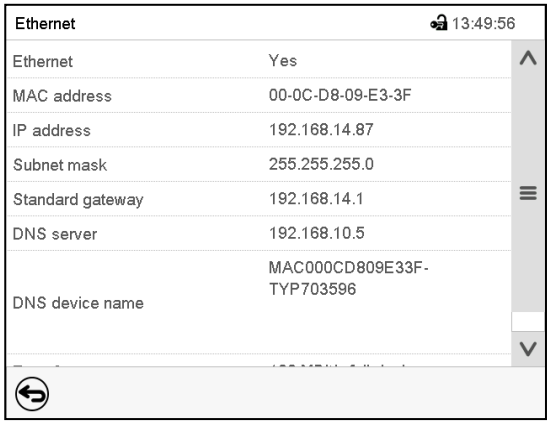
  With selection „Manual" you can enter the DNS server address manually.



After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu, **or** press the ***Close*** icon to exit the menu without taking over the entries.

14.5.2.2 Display of MAC address

Path: ***Main menu > Device info > Ethernet***



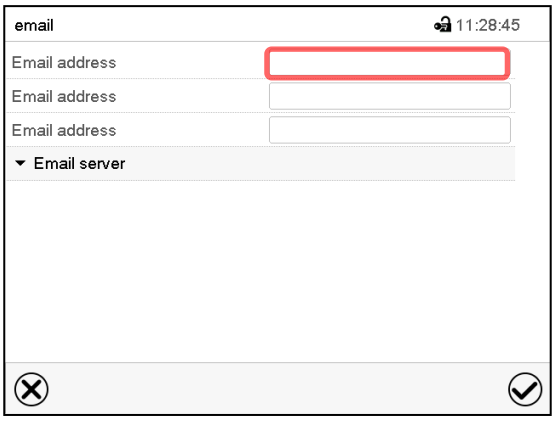
"Ethernet" submenu (example).

14.5.3 E-Mail

As soon as an alarm was triggered, an e-mail is sent to the configured e-mail address.

Path: ***Main menu > Settings > Email***

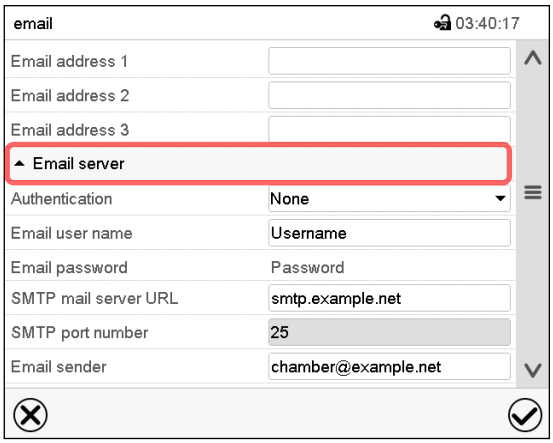
E-mail address entry:



"Email" submenu.

Select the desired e-mail address field and enter the e-mail address. You can use the ***Keybord change*** icon for entry. Confirm entry with ***Confirm*** icon.

E-mail server settings:

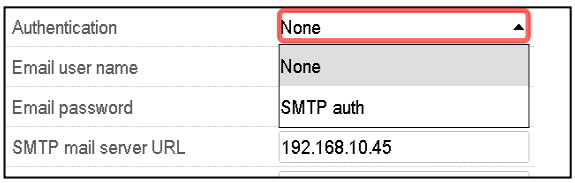


"Email" submenu.

Select the field "Email server" to access the settings

- In the field “Authentication” select the desired setting “None” or “SMTP” auth“.

  With the setting “SMTP auth”, you can enter a password under “Email password”.



- Select the field “Email user name” and enter the desired user name. Confirm entry with Confirm icon.
- Select the field “SMTP mail server URL” and enter the SMPT mail server URL. Confirm entry with ***Confirm*** icon.
- Select the field “SMTP port number” and enter the desired port number. Standard setting: “25”. Confirm entry with ***Confirm*** icon.
- Select the field “Email sender” and enter the desired Email sender. Confirm entry with ***Confirm*** icon.

After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu, **or** press the ***Close*** icon to exit the menu without taking over the entries.

14.6 USB menu: Data transfer via USB interface

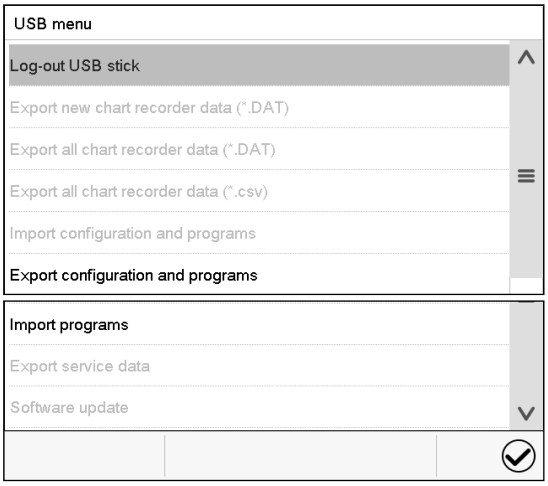
The USB port is located in the instrument box.

	CB/CB-UL: Before you begin a controller firmware update, note the humidity control value (chap. 14.6.1).

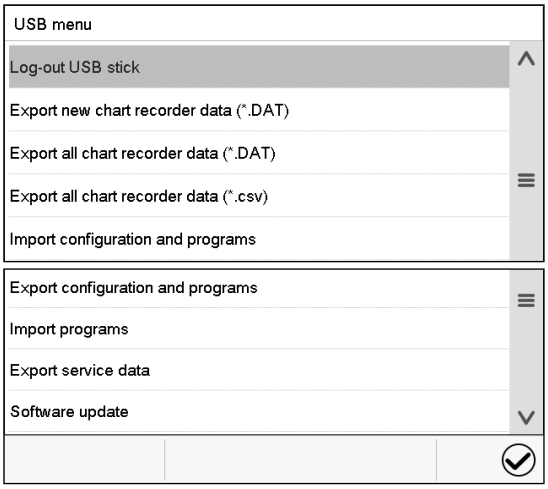
When you insert a USB-stick, the “USB” menu opens.

	The USB stick must be formatted with FAT32 and have at least 8GB of memory.

Depending on the user’s authorization level, different functions (highlighted in black) are available for the logged-in user.



Available functions
with “User” authorization level



Available functions
with “Admin” authorization level

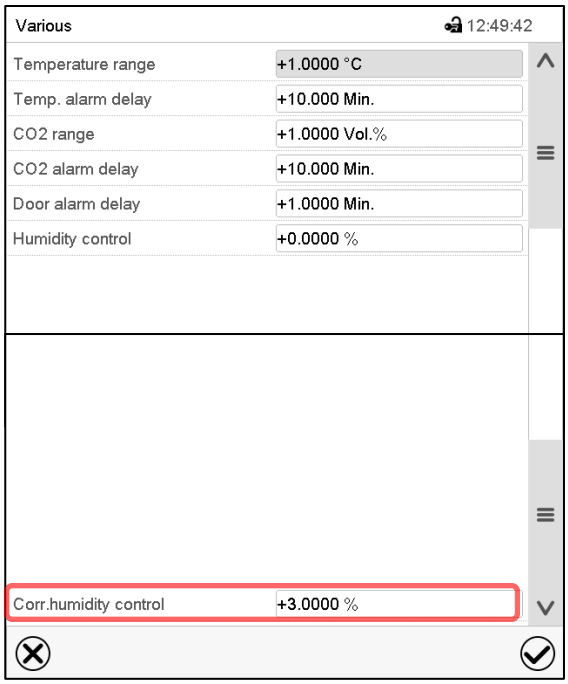
Function	Explanation
Log-out USB stick	Log-out USB stick bevor pulling it
Export new chart recorder data (*.DAT)	Export chart recorder data, which have been added since last export, in .dat format
Export all chart recorder data (*.DAT)	Export all chart recorder data in .dat format
Export all chart recorder data (*.csv)	Export all chart recorder data in .csv format
Import configuration and programs	Import configuration and timer / time / week programs
Export configuration and programs	Export configuration and timer / time / week programs
Import programs	Import timer / time / week programs
Export service data	Export service data
Software update	Controller firmware update (chap. 14.6.1)

14.6.1 Controller firmware update

Required authorization: Admin or Service.

Before inserting the USB stick:

Enter the “Various” submenu. Path: ***Main menu > Settings > Various***



Submenu “Various”.

Scroll all the way down and select the function “Corr.humidity control” (sample view).

Note down the displayed value.

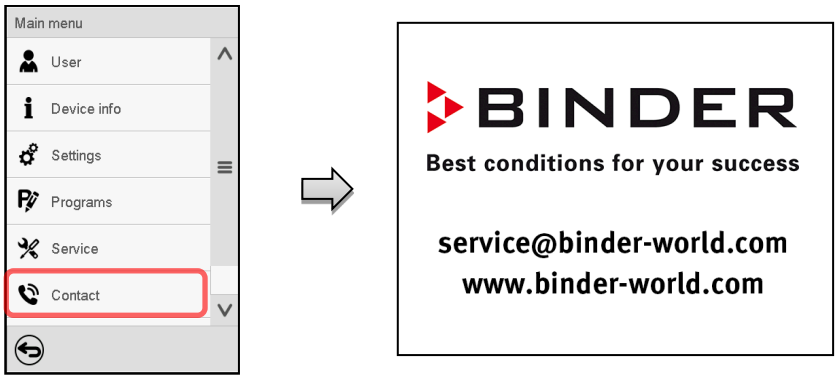
Insert the USB stick and select “Software update”. The new firmware will be installed.

Go to the “Various” menu again. Scroll all the way down and select the function “Corr.humidity control”. Enter the previously noted value and confirm your entry with the ***Confirm*** icon.

15. General information

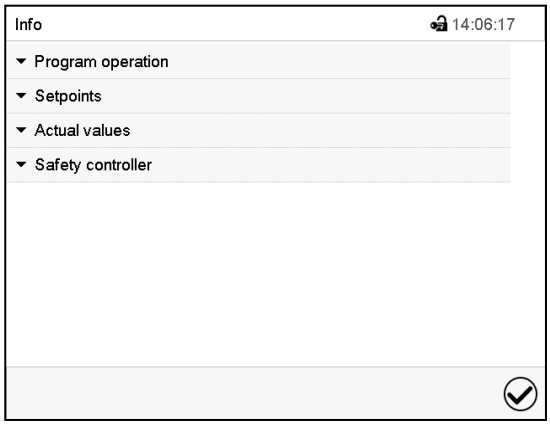
15.1 Service contact page

Path: ***Main menu > Contact***



15.2 Current operating parameters

ⓘ	Press the ***Information*** icon to access the "Info" menu from Normal display.



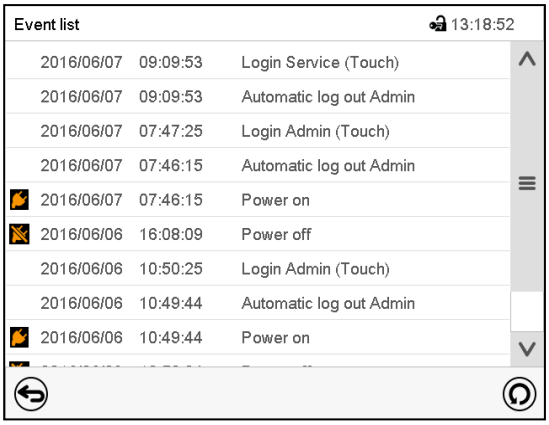
"Info" menu.
Select the desired information.

- Select "Program operation" to see information on a currently running program.
- Select "Setpoints" to see information on the entered setpoints and special controller functions.
- Select "Actual values" to see information on the current actual values.
- Select "Safety controller" to see information on the safety controller status.

15.3 Event list

The “Event list” displays status information and errors of the current day. It enables to view the last 100 events or defective conditions of the chamber.

	Press the ***Event list*** icon to access the event list from Normal display.



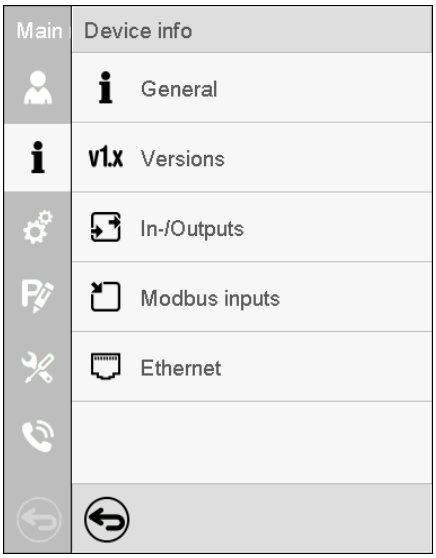
Event list

	Press the ***Update*** icon to update the event list.

	Attention: Following a modification of the language setting (chap. 14.1) or the storage interval of the chart recorder (chap. 16.2) the Event list is cleared.

15.4 Technical chamber information

Path: ***Main menu > Device info***



Chamber name and setup	
Versions of CPU, I/O module and safety controller	for BINDER Service
Information on digital and analog inputs and outputs and phase angle outputs	for BINDER Service
Information on modbus analog and digital inputs	for BINDER Service
Information on Ethernet connection, MAC address display	chap. 14.5.2
Back to main menu	

16. Chart recorder display

This view offers graphic representation of the measurement course. Data representation imitates a chart recorder and allows recalling any set of measured data at any point of time taken from the recorded period.

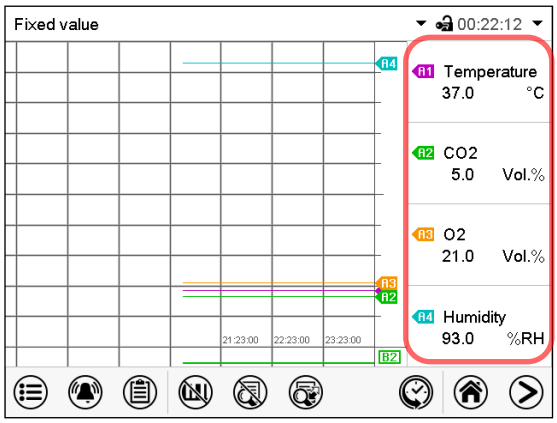
16.1 Views

	Press the ***Change view*** icon to access the pen recorder display.

16.1.1 Show and hide legend

	Show legend		***Hide legend***

Press the ***Show legend*** icon to display the legend on the right side of the display

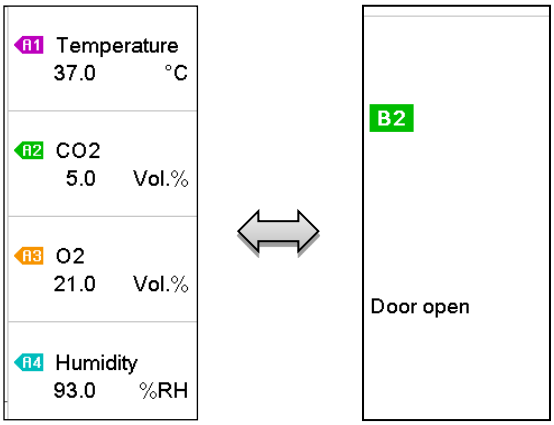


Legend shown on the right side of the display

16.1.2 Switch between legend pages

	Switch legend

Press the ***Switch legend*** icon to switch between the legend pages



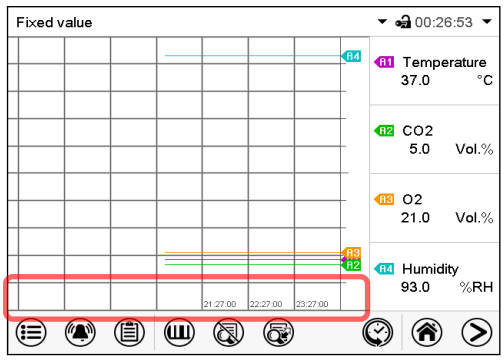
1st page 2nd page

Switching between the legend pages

16.1.3 Show and hide specific indications

	Show indications		***Hide indications***

Press the ***Show indications*** icon to display the indication “Door open” (B2).

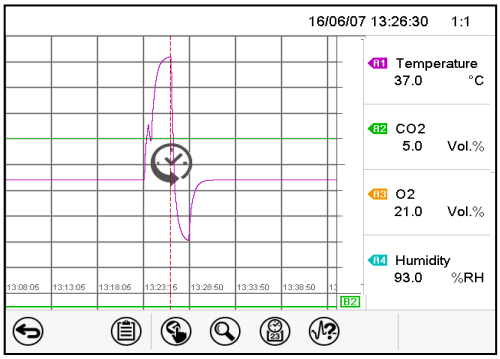


Indication “Door open” displayed (example: 1st page).

16.1.4 History display

	History display

Press the ***History display*** icon to change to the history display.



History display.

The chart recorder is paused. Data recording continues in the background.

Move the central red line by tapping and holding to the desired position.

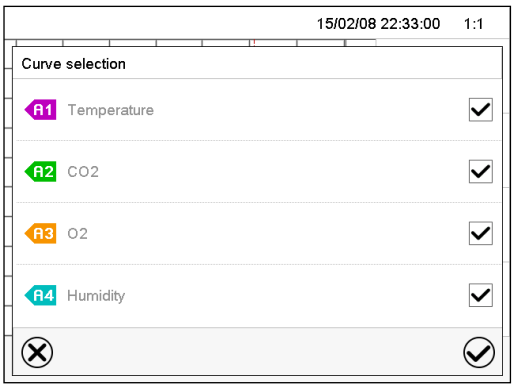
The legend at the right side shows the values of the current line position.

Then further icons appear:

History display: Curve selection

	Curve selection

Press the ***Curve selection*** icon to access the “Curve selection” submenu.



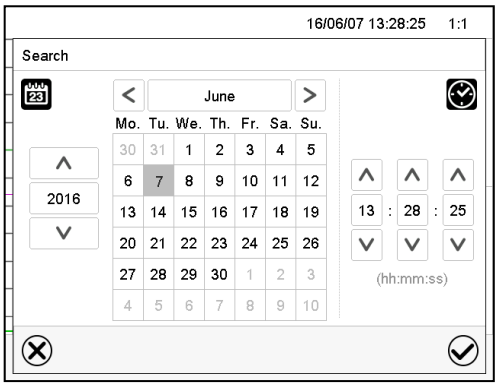
“Curve selection” submenu.

Select the curves to be displayed by checking the checkbox of the corresponding parameter. Press the ***Confirm*** icon

History display: Search the required instant

	Search

Press the ***Search*** icon to access the “Search” submenu.



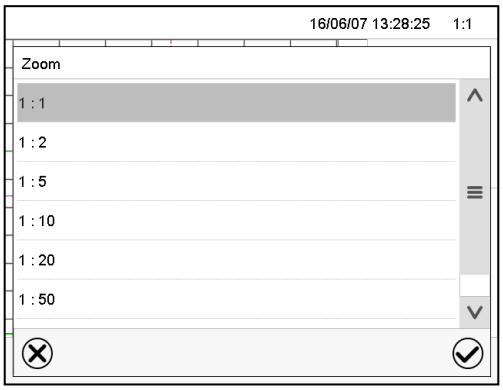
“Search” submenu.

Select the required instant by entering its date and time and press the ***Confirm*** icon

History display: Zoom function

	Zoom

Press the ***Zoom*** icon to access the “Zoom” submenu.



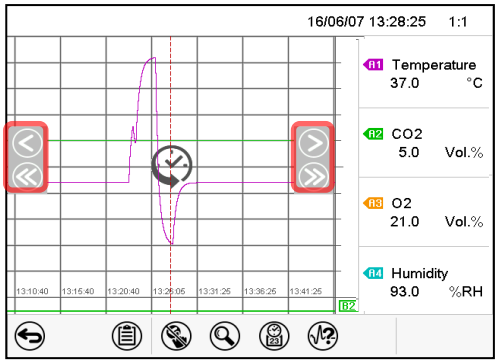
“Zoom” submenu.

Select the zoom factor and press the ***Confirm*** icon

History display: Show and hide scroll buttons to scroll to an instant

	Show scroll buttons		***Hide scroll buttons***

Press the ***Show scroll buttons*** icon to access the “Page selection” submenu.



“Page selection” submenu.

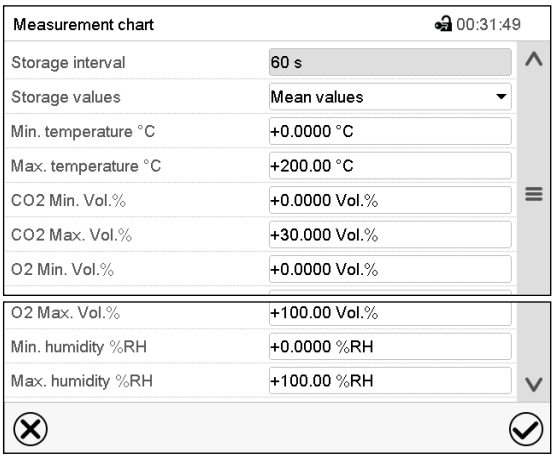
Scroll buttons are shown on the left and on the right. Use them to move along the timeline.

	Press the ***Change view*** icon to return from the pen recorder display to Normal Display.

16.2 Setting the parameters

This menu allows setting the storage interval, the type of values to be shown and the scaling of the charts.

Path: ***Main menu > Settings > Measurement chart***

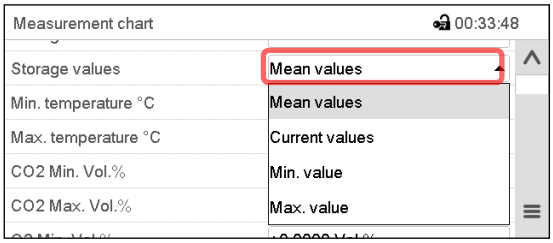


"Measurement chart" submenu.

- Select the field "Storage interval" and enter the desired storage interval. Confirm entry with Confirm icon.

  The available presentation depends on the pre-selected storage rate. Factory setting: 60 seconds. This means the higher the storage rate, the more precisely but shorter the data representation will be.

- In the field "Storage values" select the desired value type to be displayed.



- For scaling the representation select the desired minimum and maximum temperature, CO_2 / O_2 or humidity value and enter the desired values. Confirm each entry with Confirm icon.

  Display ranges:

  - Temperature: 0 °C up to 200 °C
  - CO_2: 0 Vol.-% up to 100% Vol.-%.
  - O_2: 0 Vol.-% up to 100% Vol.-%.
  - Humidity: 0% r.h. up to 100% r.h.

Setting the storage rate or rescaling (minimum and/or maximum) will clear the measured-value memory and the event list.

	NOTICE
	Danger of information loss when setting the storage rate or rescaling. **Data loss of measured-value memory and event list.** ➢ Change the storage rate or scaling ONLY if the previously registered data is no longer needed.

After completing the settings, press the ***Confirm*** icon to take over the entries and exit the menu, **or** press the ***Close*** icon to exit the menu without taking over the entries.

17. CBF / CBF-UL: Humidification system

The chamber is equipped with a capacitive humidity sensor. This results in a control accuracy of up to +/- 3 % r.h. of the set point.

You can turn humidity control on or off in the controller (chap. 6.7).

With humidity control turned off, the humidification module cools down. After activation it will take up to 10 minutes until the humidification function is fully available again.

☞	Heat emission of electrical devices connected inside the chamber may modify the temperature and humidity range.

The chambers are equipped with a door heating system to avoid condensation in the door area.

17.1 Function of the humidifying system

The humidifying system is located in the humidity generation module. In a cylindrical container with a volume of approx. 0,07 liters an electrical resistance heating evaporates water. The water content is kept close to the boiling point, and thus steam can be immediately generated in sufficient quantity for rapid humidity increases or for compensation of humidity losses, e.g. by door openings.

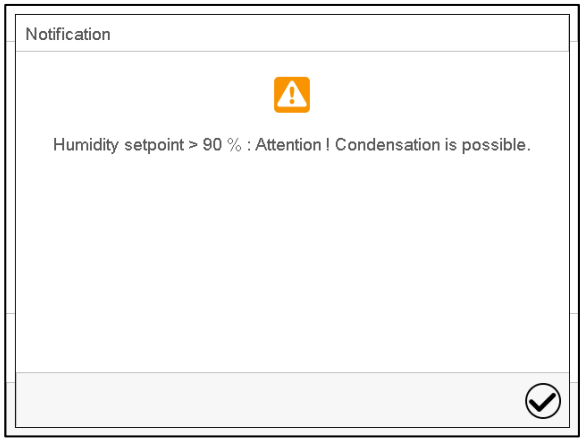
Freshwater is supplied by manually filling a freshwater bag. A peristaltic pump transports the water to the humidification module via a silicone tube.

☞	**In order to ensure accurate humidifying, observe the following points with regard to the freshwater supply:** • Water type: deionized (demineralized) water • To ensure humidification during 24 hours even at high humidity set-points, we recommend filling the freshwater bag at the end of each day. • Water intake temperature NOT below +5 °C / *41 °F* and not exceeding 40 °C / *104 °F*.

☞	BINDER GmbH is NOT responsible for the water quality provided by the customer. Any problems and malfunctions that might arise following use of water of deviating quality is excluded from liability by BINDER GmbH.

The humidity system is functional only if the freshwater bag is sufficiently filled. Check the filling level daily. The water reserve is sufficient for one up to two weeks, depending on the humidity demand (set humidity set-point, number of door openings).

For error indications concerning water supply and humidity system, see chap. 11 and 22.6.



When entering a humidity setpoint value > 90 % r.h. a message window appears, indicating that condensation is possible.

Press the ***Confirm*** icon.

17.2 Function of the dehumidifying system

To reduce the humidity, ambient air is sucked in through a gas fine filter (sterile filter). As a result, the air in the interior is diluted with the air from outside. The air tube for inlet of the ambient air is located in the upper right corner in the recess for the freshwater bag. We recommend replacing the sterile filter on this tube about once a month. To replace the sterile filter, see chap. 22.2.3.

18. Options and accessories

18.1 APT-COM™ 4 Multi Management Software (accessory)

The chamber is regularly equipped with an Ethernet interface (5) that can connect the BINDER APT-COM™ 4 Multi Management Software. The MAC Address is indicated in the “Device info” controller menu (chap. 14.5.2.2). The actual values of temperature, CO_2, O_2 (chamber with O_2 control) and humidity (CBF / CBF-UL) are given at adjustable intervals. Programming can be performed graphically via PC. Up to 100 chambers can be cross-linked. For further information on networking please refer to the operating manual of the BINDER communication software APT-COM™ 4.

18.2 Silicone access ports 30 mm / *1.18 in*, closable from both sides with silicon plugs (option)

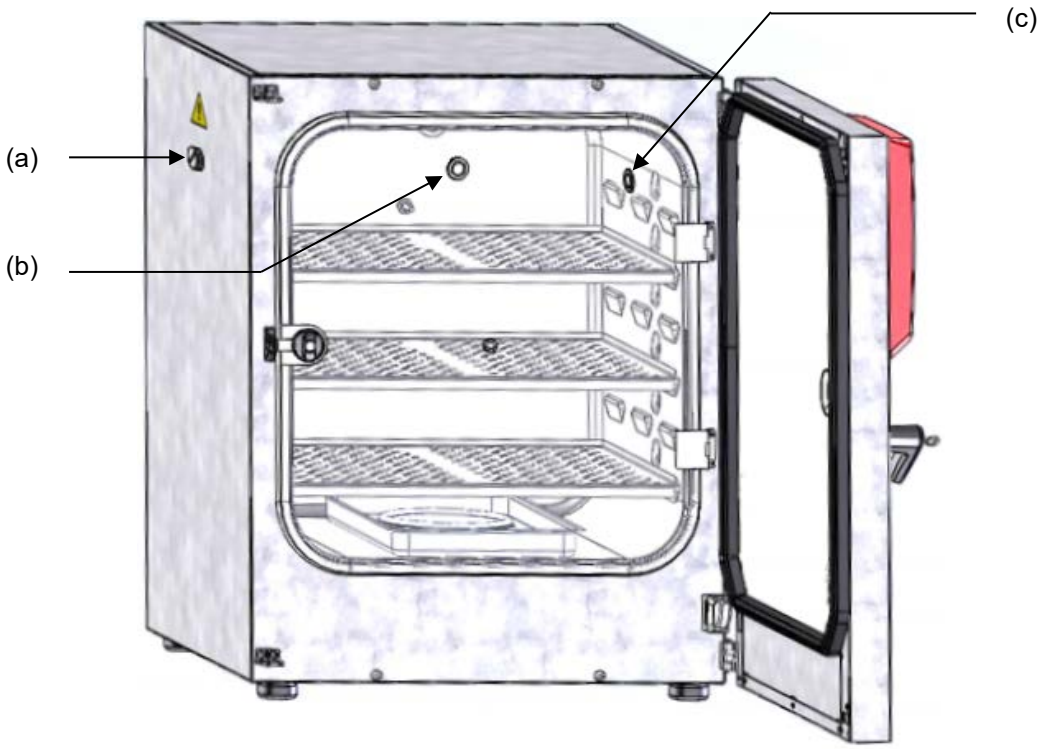


Figure 43: Positions of the optional silicon access ports left (a), rear (b), and right (c)

A warning sticker is located above each access port on the outside of the incubator.

When operating a chamber with silicon access ports, both silicon plugs must tightly close the access ports. If the plugs are inserted in a not-gastight manner, or if plugs are missing, CO_2 / O_2 / N_2 gas (chamber with O_2 control) may escape into the environment. The CO_2 control and the O_2 control (chamber with O_2 control) only turn off when the chamber door is opened.

	DANGER **Danger of suffocation and poisoning by high concentration of CO_2 (> 4 Vol.-%).** **Death by suffocation.** ➢ Tightly close each access port with two plugs during operation.

	DANGER **Danger of fire and explosion through contact of combustible materials with O_2 with high concentration of O_2 (> 21 % O_2).** **Serious injury or death from burns and / or explosion pressure.** ➢ Tightly close each access port with two plugs during operation.

18.3 Quick sample access (option)

The quick sample access option provides easy access to the sample chamber through a small window in the glass inner door. This is a useful feature in applications with short incubation times. The window measures 13 x 25 cm and is located in the bottom corner of the glass inner door.

This quick method of accessing samples is available for both the standard door hinge on the right and the door hinge on the left.

Figure 44: Glass door (detail, example door hinge on the right) with Quick sample access option

18.4 Interior socket 230V (option, available via BINDER INDIVIDUAL Customized Solutions)

	The interior socket is activated and deactivated in the controller via the switching state of a special controller function (chap. 7.3, 9.7.3, 10.6.5). When the interior socket is activated, the notification “Interior socket“ is shown highlighted in black next to the information icon in the screen header in Normal display (chap. 11.1.1)	

The interior socket (H) is located at the upper left corner on the rear wall of the inner chamber. It is closed with a waterproof lid. The interior socket is suitable to supply electrical devices inside the chamber with 230V AC voltage.

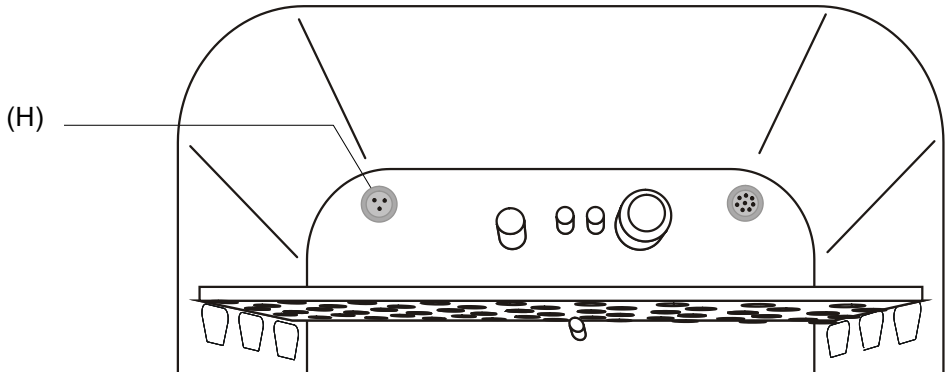


Figure 45: Position of the interior socket 230 V

(H) Interior socket

The maximum head load must not exceed a capacity of 5 W.

	NOTICE
	Danger of damage when exceeding the setpoint temperature. **Damage to the cultures.** ∅ Do NOT exceed the maximum head load of 5 W. ∅ Do NOT connect equipment with a nominal capacity > 5 W.

	Heat emission of electrical devices connected inside the CO_2 incubator may modify the temperature and humidity range. In general, any heat input leads to an increased tendency for condensation.

The maximum load must not exceed 3 Amp.

	DANGER
	Electrical hazard through overload of contacts. **Deadly electric shock. Damage to contacts and connection socket.** ∅ Do NOT exceed the maximum load of 3 A. ∅ Do NOT connect any devices with a nominal current > 3 A.

The interior socket's voltage is turned off at the chamber controller via a special controller function (chap. 7.3, 9.7.3, 10.6.5).

Turning off the chamber at the main power switch also switches the interior socket voltage-free.

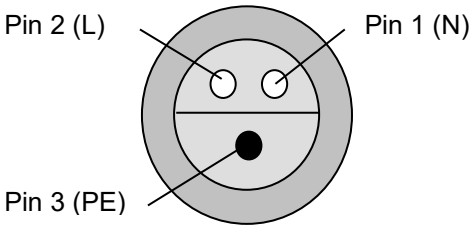


Figure 46: Interior socket (H) (front view)

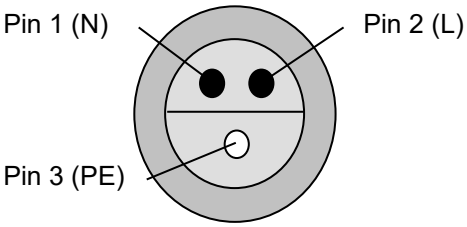


Figure 47: Supplied plug (front view)

Electrical data socket and plug: IP system of protection 65, 230 V 1N ~ 50-60 Hz

	NOTICE
	Risk of short circuit caused by penetration of moisture into the socket. **Damage to the chamber.** ➢ Use the supplied plug only (IP protection type 65). ➢ If the socket is not used, close it with the waterproof lid.

When inserting a heat load into the inner chamber by introducing electrical devices such as shakers or rollers, the ambient temperature of the incubator must not exceed 25 °C / *77 °F*. Otherwise, temperature control to 37 °C / *98.6°F* cannot be assured. When operating electrical devices inside the incubator, always check the desired incubation temperature **before** introducing any cells.

	NOTICE
	Danger of excessive inner temperature > 37 °C / *98.6 °F* when operating electrical devices inside the incubator. **Damage to the cell cultures.** ➢ Make sure that the ambient temperature is ≤ 25 °C / 77 °*F* when operating electrical devices inside the incubator:. ➢ Check the temperature observation before introducing any cells.

18.5 Analog outputs for temperature and CO_2 (option)

With this option, the chamber is equipped with analog outputs 4-20 mA for temperature and CO_2. These outputs allow transmitting data to external data registration systems or devices.

The connection is realized as a DIN socket (4) on the chamber rear. A suitable DIN plug is enclosed.

ANALOG OUTPUT 4-20 mA DC

PIN 1: Temperature +
PIN 2: Temperature -
PIN 3: CO_2 +
PIN 4: CO_2 -

CO_2 range:	0 vol.-% up to 20 vol.-%
Temperature range:	0 °C / *32°F* up to +200 °C / *392°F*

Figure 48: Pin configuration of the DIN socket (4) on the chamber rear

18.6 Access port for extra-low voltage (option)

The access port (B) (8-pin) for extra-low voltage (ELV) consists of a LEMO socket (which can be covered) and a LEMO connector. It is suitable to connect two electrical devices, one inside and one outside the incubator. You can use it e.g. for devices with a monitoring and control part remaining outside the incubator, whereas its mechanical component like roller or shaker systems is located inside the chamber.

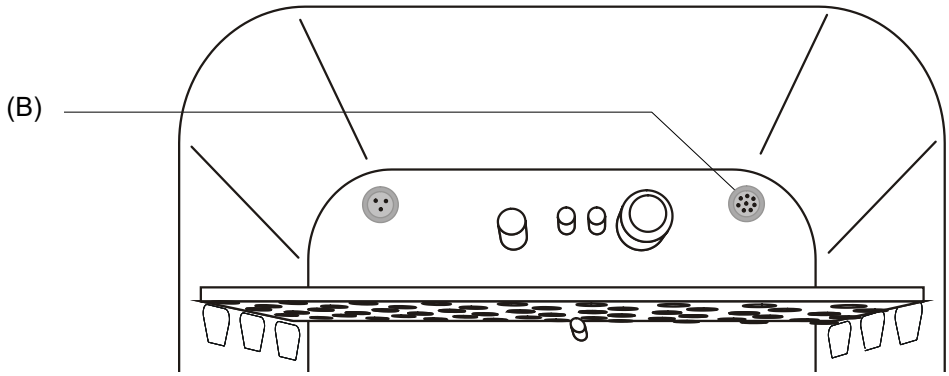


Figure 49: Position of the access port for extra-low voltage

Maximum power rating 24V AC/DC 2Amp.

	DANGER
	Electrical hazard through overload of contacts. **Deadly electric shock. Damage to contacts and connection socket.** ∅ Do NOT exceed the maximum load of 24V AC/DC 2Amp. ∅ Do NOT connect any devices with a nominal current > 2 Amp. ∅ Do NOT connect any devices with a nominal voltage > 24 V DC.

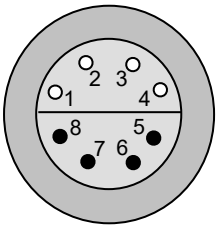
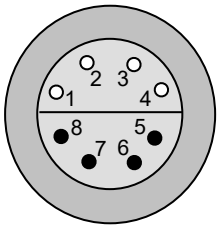
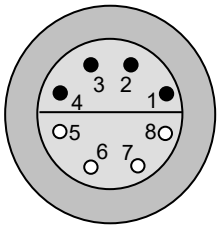
		
On chamber rear: Exterior Lemo socket (2) on the rear of the chamber	Interior: LEMO socket (B) located at the upper right corner of the rear wall of the inner chamber	Supplied LEMO connector: on external and internal side

Figure 50: Pin allocation (front view) of the Lemo sockets and plug

When introducing a heat load into the inner chamber by inserting electrical devices like shakers or rollers, the ambient temperature of the incubator must not exceed 25 °C / *77°F*. Otherwise, temperature control to 37 °C / *98.6°F* cannot be assured. When operating electrical devices inside the incubator, always check the desired incubation temperature **before** introducing in any cells.

	NOTICE
	Danger of excessive inner temperature > 37 °C / *98.6 °F* when operating electrical devices inside the incubator. **Damage to the cell cultures.** ➢ Make sure that the ambient temperature is ≤ 25 °C / 77 °*F* when operating electrical devices inside the incubator:. ➢ Check the temperature observation before introducing any cells.

18.7 BINDER Gas Supply Service – External bottle changer for CO_2, N_2 or O_2 (option)

The external bottle changer permits automatic switching to a second gas cylinder as soon as the first cylinder is empty. It can be used for a maximum of two CB chambers.

	Instructions 7001-0196 delivered with the external bottle changer (Art. no. 8012-0408) describe its installation and operation.

18.8 Stands (accessories)

18.8.1 Flat stacking adapter for thermally decoupled stacking (accessory)

We recommend not stacking the incubators directly on top of one another in order to avoid transmission of shocks and vibrations from one chamber to the other. This could happen e.g. while opening or closing the door, cleaning, charging and discharging the chamber. BINDER offers a flat stacking adapter for the safe stacking of two BINDER CO_2-incubators.

The stacking adapter ensures that the set incubation parameters are precisely maintained also during sterilization of the other chamber (chap. 21.3) by thermal decoupling.

Art. No. 9051-0038 for incubator size 56, Art. No. 9051-0035 for incubator size 170, Art. No. 9051-0039 for incubator size 260.

	The mounting instructions 7001-0294 delivered with the stacking adapter describe its installation.

18.8.2 Stacking stand on castors with castors lockable by breaks (accessory)

We recommend not stacking the incubators directly on top of one another in order to avoid transmission of shocks and vibrations from one chamber to the other. This could happen e.g. while opening or closing the door, cleaning, charging and discharging the chamber. BINDER offers stable, vibration-free stands with castors (2 lockable by brakes) for the safe stacking of two BINDER CO_2-incubators.

The stacking stand ensures that the set incubation parameters are precisely maintained also during sterilization of the other chamber in the same stacking stand (chap. 21.3) by thermal decoupling.

Using the stacking stand offers more advantages: You can pull the lower chamber forward separately (e.g., for access to the rear), and not have to place it directly on the floor (important for sanitary purpose).

Art. No. 9051-0020 for incubator size 170, Art. No. 9051-0041 for incubator size 260.

	The mounting instructions 7001-0194 delivered with the stacking stand describe its installation.

18.8.3 Base on castors (accessory)

In order to obtain easy access to the chamber, for safe placement and leveling of a BINDER CO_2 incubator, and to avoid contamination of the chamber caused by soil pollution, BINDER recommends using the base on castors.

Art. No. 9051-0043 for incubator size 56, Art. No. 9051-0028 for incubator size 170, Art. No. 9051-0044 for incubator size 260.

	The mounting instructions 7001-0147 delivered with the base on castors describe its installation.

18.9 Water supply sets (accessories for CBF / CBF-UL)

18.9.1 BINDER water set (accessory)

For the optional water supply via prefilled water bottle, a humidification water set with 10 prefilled one-liter bottles (10 weeks demand) is available. It includes all necessary connecting parts. For details please refer to chap. 4.5.2.

By using the humidification water set you will achieve unsurpassed contamination safety of your samples in the BINDER CO_2 incubator CBF / CBF-UL.

18.9.2 Tubular bag set (accessory)

For the water supply via freshwater bag (standard), sets with 3 or 12 tubular bags (3 months or annual demand) are available. The bag set includes all necessary connecting parts.

For details please refer to chap. 4.5.2.

18.9.3 Water container set (accessory)

The fresh water can, which is placed in an included magnetic can holder on the left chamber side, serves to supply one or several chambers with freshwater for humidification.

The water container set includes all necessary connecting parts. For details please refer to chap. 4.5.4.

18.9.4 BINDER Pure Aqua Service (accessory)

The BINDER water treatment system (disposable system) is available as an accessory to treat tap water. The lifetime depends on water quality and the amount of treated water used. The measuring equipment to assess the water quality is reusable.

	For detailed information on operating the water treatment system BINDER Pure Aqua Service and its function, please refer to the operating manual supplied with BINDER Pure Aqua Service.

19. Reference measurements

Reference measurements of the temperature, CO_2, O_2 (chamber with O_2 control), and humidity can be performed via the silicone measuring port (K) located on the inner glass door. Reference temperature measurements always take place under equilibrated conditions with both doors closed.

19.1 CO_2 reference measuring

There are three possibilities to perform CO_2 test measurements between the recommended annual maintenance procedures. To test the CO_2 concentration inside an incubator, see chapters 19.1.1 to 19.1.3.

19.1.1 Measuring CO_2 concentration indirectly via the pH of the cell medium

By using the indirect determination of CO_2 concentration via the pH-value of the nutrient, it is possible to check the CO_2 concentration inside the chamber. This is a simple method to test the correct CO_2 concentration without any special CO_2 measuring equipment. You need only use an accurate pH indicator or a pH-measuring electrode, which are standard equipment in cell culture laboratories.

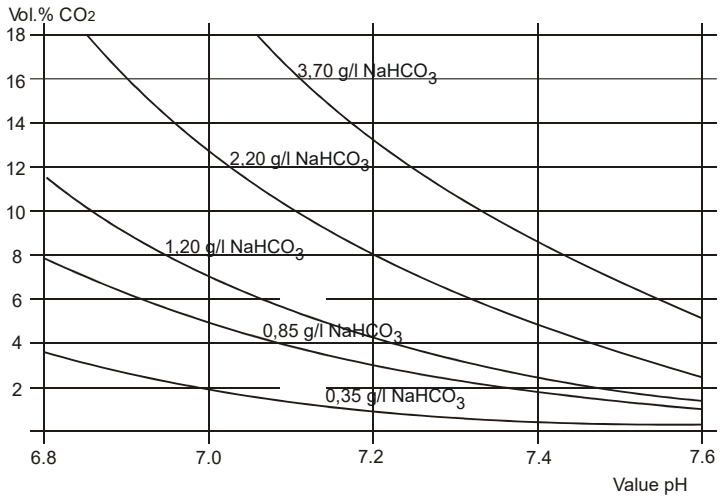
This method is based on the acid base equilibrium of the buffer system in the culture media. $NaHCO_3$ buffers the common media. From the pH value of the medium, it is possible to conclude its CO_2 concentration. Figure 51 shows the relationship between CO_2 concentration in vol.-% and the pH of different $NaHCO_3$ buffered media.

☞	These test systems are not suitable for calibrating the BINDER sensor system.

Recommended procedure:

- Incubate an empty sample with medium for 1/2 day under the same conditions as the cells. You can perform the incubation in a cell culture cylinder or in a 50 ml Falcon tube with open lid.
- After gassing, remove the empty sample from the incubator and within 5 minutes measure the pH-value with a glass electrode.

  During the measurement, the medium should have the least possible surface contact with the ambient air, so that the CO_2 can evaporate only slightly. A significant downward movement will happen only after 5 minutes, permitting sufficient time for measurement.
- In addition, you can of course use pH-test strips (pH range 6 to 8, not bleeding).



Trade names of common media:	
	$NaHCO_3$ [g/l]
DMEM	3.70
BME	2.20
MEM	2.20
Medium 199	2.20
Mc Coy	2.20
F10	1.20
F12	1.20

Figure 51: Value pH of $NaHCO_3$ buffered media as a function of the CO_2 concentration:

Example: If a pH of 7.2 is measured in a medium buffered with 2.20 g $NaHC0_3$ per liter, there must be 8 vol.-% CO_2 surrounding this medium.

19.1.2 Measuring CO_2 directly via chemical indicator tubes

This is a common “do-it-yourself” test for many users. A chemical color reaction in a glass tube shows the CO_2 concentration. A standardized volume of air from inside the incubator has to be suctioned through this glass tube to get a quantitative test result. Therefore, use a special hand pump with a standardized suction volume.

Procedure (example):

All the necessary equipment must be supplied by one manufacturer only and in a defined test system.

Note: These test systems are not very accurate. A typical accuracy is around 10 % of the full-scale value.

☞	These test systems are not suitable for calibrating the BINDER sensor system.

19.1.3 Measuring CO_2 directly with an electronic infrared measuring device

Another possible way of measuring the CO_2 concentration is by electronic sensor systems. Portable measuring devices are suitable for measuring temperature and CO_2 concentration and can be used both for reference measurements in certified laboratories, and for service purposes.

19.2 Temperature reference measurement

When performing a temperature reference measurement using an electronic measuring, and temperature display device, it is important to use a device traceable to an acknowledged standards/calibration institution (DKD, PTB for Germany) with a valid calibration certificate.

Note: The cable of the sensor must be thin enough to lay it over the door gasket of the incubator without causing any leakages.

20. Avoiding microbial contamination

The main types of microbial contaminants in cell and tissue culture are bacteria, fungi, yeast, mycoplasma, and viruses. This chapter gives an overview of potential sources of contamination and precautions and measures to eliminate them.

20.1 Cells and media

- Primary cultures from the original tissue
- Cells / cell lines from unknown sources or from cell banks: Use only cells of known and tested origin. Monitoring and routine screening of new cultures.
- Media and sera: Use only sera of known and tested origin (mycoplasma free, e.g., UV or γ radiated).
- Virus suspensions, antibody solutions etc. Use only reagents of known and tested origin.
- Laboratory instruments, media and reagents that were exposed to possible contaminated cultures must be sterilized / autoclaved / disposed.
- Antibiotics in the cell culture media may prevent bacteria detection: Use antibiotics selectively and economically.

20.2 Laboratory conditions / equipment around the incubator

Possible sources of contamination in the cell culture lab are airborne germs, lab equipment, building features, and the lab personnel.

- Keep pipettes and instruments sterile after autoclaving.
- Bio safety cabinets (laminar air flow) should have a minimum of items apart from aspirator tube and burner. Items shall be positioned within easy reach and separate from each other. Disinfect surfaces with an alcohol-based disinfectant before and after use, clean the space underneath the bench, and carry out regular sterility tests of the filters.
- Regular cleaning / disinfection of laboratory equipment such as a centrifuge, microscope, water bath, refrigerator, and telephone.
- No equipment should be placed on the floor.
- Rough or humid walls are not suitable.
- Identify leaking doors and windows and make them airtight.
- Use air conditioning with special filters.
- Reduce the number of personnel and their movements in the lab by careful positioning all relevant equipment. For practical reasons, install the chamber close to the laminar air flow bench.
- Regular microbiological monitoring of the cell culture laboratory.

20.3 Working and behavior in the lab

Sources of contamination are often the laboratory personnel themselves (surface germs, oral flora droplet transfer) and handling the equipment and cultures. We recommend staff training in aseptic techniques, laboratory safety and good laboratory practice (GLP).

Examples of general rules to reduce the contamination risks

- Reduce hand germ count (wash hands with antimicrobial soap, dry with paper tissues, and rub dry hands with alcohol-based solution).
- Wear appropriate clothing (work coat, shoes, face mask)
- Keep as few personnel as possible in the cell culture lab.

Examples of sterile working method

- Work "clean-to-dirty", i.e., handle confirmed uncontaminated cells first, unknown or untested cells next, and lastly, if necessary, cells suspected to be contaminated.
- Perform daily microscopic observations of cultures and specific tests for the bacteria and fungi as part of a controlled routine. Test cultures for sterility before starting work.
- Keep working surfaces clean. Immediately wipe spilled liquids with alcohol solutions.
- No mouth contact on pipettes.
- Never work on top of open sterile containers.

20.4 Chamber design and equipment of the CO_2 incubator

The design concepts behind the CO_2 incubator considerably reduce the risk of contamination. Among them are:

Even surfaces for easy manual cleaning

- The inner surfaces are smooth and therefore easy to clean. The inner chamber is deep-drawn from a single piece, polished (suitable for pharmaceutical work) and has no welds or inaccessible corners. The hinges and the seal of the inner glass door are glued from the outside, which also aids cleaning of the inner chamber.

Removable parts for cleaning and autoclaving

- The shelves are easily removed without screws. It is possible to autoclave the shelves. But this is generally not necessary because they can remain inside the chamber during sterilization.

Door gasket

- The inner door gasket is removable and autoclavable.

Gas fine filter

- The incoming gas used in the operation passes through a fine filter (aseptic filter, filtration efficiency 99.99 %, particle size 0.45 µm) with a high filtration efficiency, which can also filter the smallest particles.

CO_2 measuring system in the inner chamber

- The CO_2 sensor can be hot-air sterilized inside the chamber.

O_2 measuring system in the inner chamber (chamber with O_2 control)

- The O_2 sensor can be hot-air sterilized inside the chamber.

Humidity measuring system in the inner chamber (CBF / CBF-UL)

- The humidity sensor can be hot-air sterilized inside the chamber.

Condensation prevention

- Condensation in the inner chamber represents a particular risk of contamination. The Permadry™ system (CB / CB-UL) developed by BINDER is an effective and easy way to ensure high humidity (≥95 % r.h.) inside the chamber without any condensation forming on the inner surfaces.

Hot air sterilization

- The heating system of the CO_2 incubator permits hot-air auto-sterilization at a setpoint of 180 °C / *356 F*. Thus, the effective sterilization temperature is maintained for at least two hours on all internal surfaces, resulting in sterilization of the entire inner chamber.

20.5 Handling the CO_2 incubator

Any manipulation of the CO_2 incubator involves some contamination risks, from installation to opening the doors and regular cleaning.

Installation away from sources of contamination

- Do not place the chamber on the floor or close to windows and doors. Use the accessory stand, if appropriate.

Reduce the periods in which the door is open

- Do not open the door too frequently.
- Placing items in order inside the chamber results in shorter door opening times.

Permadry™ water pan (CB / CB-UL)

- Fill the outer pan with distilled, sterilized water (chap. 4.2). Never use ion exchange water; ion exchangers are propagation sites for bacteria.
- Clean and refill the pans 2 to 3 times a week. For evacuation, remove the Permadry™ water pan. It is autoclavable.
- If desired, you can add microbiologically inhibiting substances as copper chips, copper sulfate or ethylene diamine tetra-vinegar acid (EDTA) in a concentration of 1 to 5 mmol/l.

Avoiding condensation caused by ambient conditions

Ambient room conditions have an effect on condensation inside the chamber, which can be caused by insufficient wall clearances, preventing even dissipation of heat, air movement or direct sunlight. If the temperature distribution inside the chamber becomes uneven, condensation may form on the cooler surfaces.

- Maintain distances from the wall: rear 100 mm / *3.94 in*, sides 50 mm / *1.97 in*
- Do not place the chamber in front of a window. No direct sunlight. No air movement.
- Permissible ambient temperature range for operation: +18 °C / *64.4°F* to +30 °C / *86°F*.

  Ideal ambient temperature: by at least 7 °C / *12.6 °F* below the intended working temperature. E.g., working temperature 37 °C / *98.6 °F* = ambient temperature 30 °C / *86 °F* and less.
- The chamber should be calibrated / precisely adjusted.
- Let BINDER Service adjust the setting of the door heating in reaction to critical ambient conditions.

Regular cleaning, decontamination and sterilization

- Clean the shelves, glass door, gaskets, and inner chamber weekly (for cleaning see chap. 21.1, for decontamination see chap. 21.2. You can clean the shelves in a laboratory dishwasher and, if needed, individually autoclave them.
- Regularly use the hot air sterilization function (chap. 21.3) following cleaning. The shelves and the emptied water pan (CB / CB-UL) can remain inside the chamber during this operation.
- Have replaced the CO_2 sterile filter (gas fine filter) once or twice a year.

What to do in case of contamination?

- Throw away / autoclave contaminated cultures.
- Carefully inspect cultures that seem to be uncontaminated.
- Clean the chamber as described. Wipe the inner chamber and the doors with a disinfectant and allow drying. Autoclave the shelves. Empty the water pan and autoclave it (CB / CB-UL).
- Perform a hot air sterilization.

21. Cleaning, decontamination / disinfection, and sterilization

Clean the chamber after each use in order to prevent 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.

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. Let the chamber cool down to ambient temperature.

➢ Completely dry the chamber before turning it on again.

	DANGER
	Danger of explosion due to cleaning agents on hot surfaces. **Serious injury or death from burns and / or explosion pressure.** ➢ Before cleaning, turn off the chamber at the main power switch and disconnect the power plug. ➢ Before cleaning, let the chamber cool down to ambient temperature. ➢ Completely dry the chamber before turning it on again.

21.1 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:

Exterior surfaces, instrument panel	Standard commercial cleaning detergents free from acid or halides. Alcohol-based solutions. We recommend using the neutral cleaning agent Art. No. 1002-0016.
Inner chamber, shelves, fresh water can (accessory)	Standard commercial cleaning detergents free from acid or halides. Copper sulfate solutions or alcohol-based solutions. We recommend using the neutral cleaning agent Art. No. 1002-0016.
Silicone door gasket	Alcohol-based solutions or the neutral cleaning agent Art. No. 1002-0016.
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 BINDER service.

	We recommend using the neutral cleaning agent Art. No. 1002-0016 for thorough cleaning. Any corrosive damage that may arise following use of other cleaning agents is excluded from liability by BINDER GmbH. Any corrosive damage caused by a lack of cleaning, is excluded from liability by BINDER GmbH.

	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.

To maintain the proper function of the CO_2 sensor, never spray the sensor with any cleaning detergents or disinfectants.

	NOTICE
	Damage to the CO_2 sensor due to unsuitable cleaning procedures. **Damage to the chamber.** ∅ NEVER spray any cleaning detergents directly on the CO_2 sensor. ➢ Wipe the sensor with a lint-free cloth soaked with cleaning agent.

Use only the detergents or disinfectants recommended by BINDER. Other products are not approved, since they could in particular damage the CO_2 sensor.

	For surface protection, perform cleaning as quickly as possible. After cleaning completely remove any cleaning agents from the surfaces by using a moistened towel. Let the chamber dry.

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

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

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

	The neutral cleaning agent 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 the 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.

	Following use of the neutral cleaning agent and prior to hot-air sterilization, remove any agent residues by using a moistened towel in order to avoid formation of permanent residues.

21.2 Decontamination / chemical disinfection of the chamber

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 BINDER service.

You can use the following disinfectants:

Inner chamber	Standard commercial surface disinfectants free from acid or halides. Alcohol based solutions. We recommend using the disinfectant spray Art. No. 1002-0022.
Fresh water can (accessory)	Rinse with 70° Ethanol

	For chemical disinfection, we recommend using the disinfectant spray Art. No. 1002-0022. Any corrosive damage that may arise following use of other disinfectants is excluded from liability by BINDER GmbH.

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

In case of contamination of the interior by biologically or chemically hazardous material, there are two possible procedures depending on the type of contamination and charging material.

- Spray the inner chamber with an appropriate disinfectant.

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

- If necessary, have strongly contaminated inner chamber parts removed by an engineer for cleaning, or have them exchanged. Sterilize the inner chamber parts in a sterilizer or autoclave.

	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.

	Following frequent use of the disinfectant spray and prior to hot-air sterilization, remove any agent remainder by using the neutral cleaning agent and then a moistened towel to avoid formation of permanent residues.

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

21.2.1 Disinfection of the CO_2 sensor

To ensure proper disinfection and function of the CO_2 sensor, BINDER recommends wiping the sensor head with pure alcohol or a non-corrosive, acid and chlorine-free alcohol based surface disinfectant. We recommend using the disinfectant spray Art. No. 1002-0022.

Important: To maintain the proper function of the CO_2 sensor, never spray the sensor with any cleaning detergents or disinfectants. Generally perform any disinfection only when the chamber is turned off. The sensor may be only superficially disinfected with a damp cloth. The hot air sterilization routine is intended for a thorough sterilization of the entire chamber.

	NOTICE
	Danger of damage to the CO_2 sensor due to unsuitable disinfection procedures. **Damage to the CO_2 sensor.** ∅ NEVER spray the disinfectant directly on the CO_2 sensor. ➢ Wipe the sensor with a lint-free cloth soaked with the disinfectant.

Use only the detergents or disinfectants recommended by BINDER. Other products are not approved, since they could in particular damage the CO_2 sensor.

21.2.2 CBF / CBF-UL: Disinfection of components of the fresh water supply system

Freshwater is supplied by manually filling a freshwater bag (tubular bag set, standard, can be reordered) or a freshwater can (water container set accessory). It is also possible to connect prefilled water bottles (BINDER water set accessory).

The freshwater bag can be refilled several times, but should be replaced from time to time for hygienic reasons.

The silicone tubes and tube connectors can be autoclaved. They can also be replaced for hygienic reasons.

For the fresh water can we recommend thorough cleaning using a recommended cleaning agent (chap. 21.1) followed by rinsing with 70 % ethanol.

21.3 Hot-air sterilization

	The very first sterilization after operation may cause an odor. This is not a quality defect. We recommend ventilating well the room during sterilization.

21.3.1 Overview

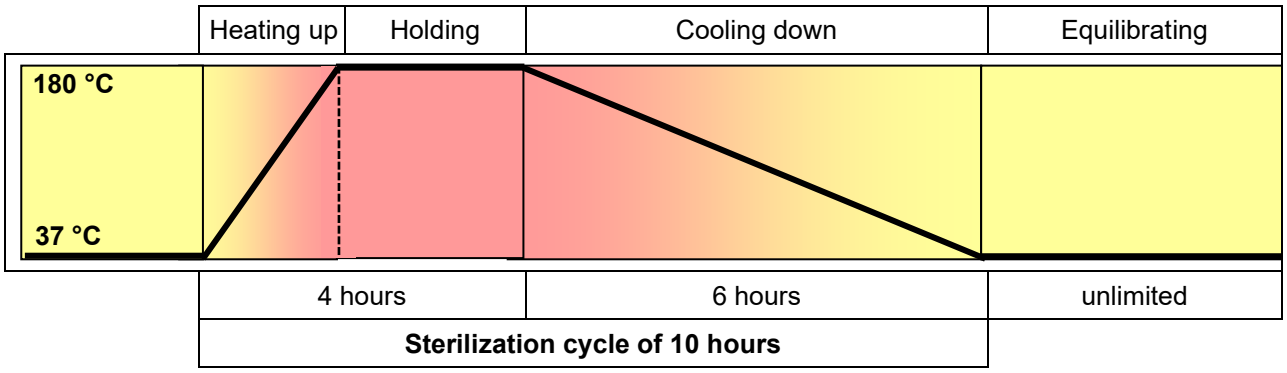


Figure 52: Setpoint profile during the sterilization cycle

The chamber can perform an automatically controlled hot-air sterilization cycle. This procedure of 10 hours consists of the following steps:

- **Heating up phase:** The chamber heats up the inner chamber as fast as possible to the sterilization setpoint temperature
- **Holding phase:** Constant sterilization setpoint temperature

  The sterilization setpoint temperature is pre-set in factory to 180 °C / *356 °F*. The duration of the heating up and holding phase is in total 4 hours. This ensures that the effective sterilization temperature is maintained on all internal surfaces for at least 2 hours. The effectiveness of the sterilization has also been confirmed by an independent research institute.
- **Cooling down phase:** Programmed duration of 6 hours until 37 °C / *98.6°F* is reached
- Then follows an **equilibration phase:** After the 10-hour sterilization cycle the controller changes to fixed value operation mode and equilibrates to the set-point which has been entered there (e.g., 37 °C / *98.6 °F*).

Note: in the case when two chambers are directly stacked on top of each other **without** using the original BINDER stacking stand or the BINDER stacking adapter, the exact maintenance of the incubation set parameters in one of the chambers while carrying out sterilization in the other one cannot be assured. Therefore, without using the stacking stand or the stacking adapter, safe incubation is not possible during sterilization of the other chamber. We recommend using a stacking stand (chap. 18.8.2).

CO_2 / O_2 control is deactivated during the sterilization cycle. To activate gas control, the following conditions are required:

- Completing or prematurely terminating the sterilization cycle and confirming the corresponding information message
- Inner chamber temperature below 80 °C

	If the temperature exceeds < 80 °C, gas control will remain deactivated even after completing or prematurely terminating the sterilization cycle. Only after the temperature has decreased below 80 °C, gas control will turn on again.

21.3.2 Preparation for a hot-air sterilization

	Before carrying out the first hot-air sterilization, remove any protective lamination sheet from the inner metal surfaces.

	When starting a hot-air sterilization, all gas controls automatically deactivate.

	The safety controller settings are inactive during sterilization. They become functional again following completing or prematurely terminating of the sterilization cycle and/or restart of the chamber at the main power switch.

	The O_2 sensor must be plugged in during a hot-air sterilization.

- Empty the Permadry™ water pan (CB / CB-UL).

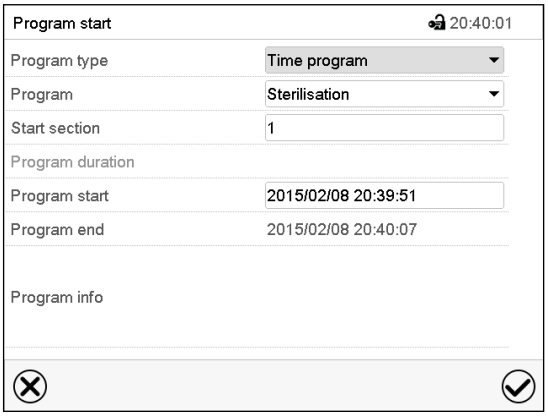
	WARNING **Danger of implosion caused by a filled water pan during sterilization.** **Destruction of the chamber.** ➢ Empty the Permadry™ water pan before starting the hot-air sterilization.

- Water pans (CB / CB-UL) and shelves must be inside the chamber.
- Close the inner glass door and the outer chamber door.

	Before starting a hot-air sterilization, the entire interior must be clean and dry. No residue of e.g., water, medium or plastic must remain inside the chamber.

21.3.3 Starting the sterilization cycle and running the hot-air sterilization

	In Normal display press the ***Program start*** icon to access the “Program start” menu.



“Program start” menu

- In the field “Program type” select the setting “Time program”.
- In the field “Program” select the program “Sterilization”.
- Select the field “Program start” and enter the desired program start time in the “Program start” entry menu. Press the ***Confirm*** icon.

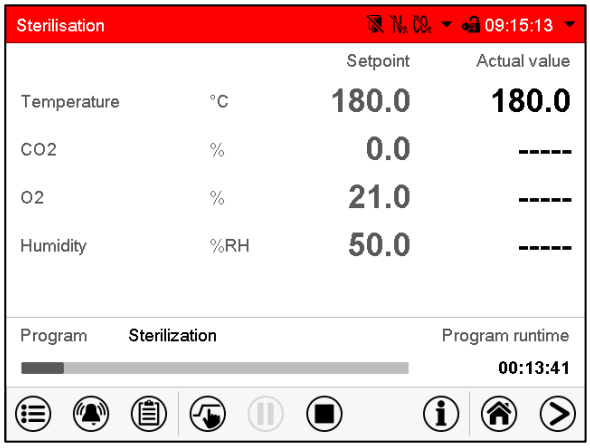
A confirmation prompt is displayed.

Confirmation prompt.

Make sure that the water pan was emptied (CB / CB-UL) and all samples were removed from the chamber and press the ***Confirm*** icon to confirm the message.

The controller returns to the initial view and the program delay time until program start begins.

When the program delay time is over, the hot-air sterilization cycle begins.



Normal display with alarm message “Sterilization”.

The sterilization is running.

The zero-voltage relay alarm output and the buzzer are not activated.

Opening the outer door leads to prematurely terminating the running sterilization cycle. If this happens during the heating up or holding phase (during 4 hours after starting the sterilization cycle), sterilization will be ineffective (chap. 21.3.4.1).

	NOTICE
	Danger of interrupting the temperature reaction time by opening the outer door during the heating up or holding phase. **Ineffective sterilization.** ∅ Do NOT open the chamber doors during the heating up or holding phase of the sterilization cycle

Glass door and inner chamber become hot during sterilization.

	CAUTION
	Danger of burning by touching hot chamber parts during a sterilization. **Burns.** ∅ Do NOT touch the inner surfaces, inner doors, inner door handles, and door gaskets during a sterilization.

Note: Since the stored sterilization program cannot be changed, it is not accessible via the program path *Main menu > Programs > Time program.*

The sterilization program must not be interrupted using the ***Program pause*** icon.

	NOTICE
	Danger of interrupting the temperature reaction time by pausing the sterilization program during the heating up or holding phase. **Ineffective sterilization.** ∅ DO NOT interrupt a running sterilization program during the heating up or holding phase of the sterilization cycle. ➢ If necessary, repeat the sterilization.

21.3.4 Prematurely terminating the sterilization cycle

Three events lead to terminating the sterilization cycle prematurely:

- Cancelling the program via the controller menu

  To prematurely terminate the sterilization cycle via the controller menu, press the ***Program cancelling*** icon and confirm the confirmation prompt with the ***Confirm*** icon (chap. 9.2.2).

- Opening the outer door
- Turning off the chamber at the main power switch, or a power failure

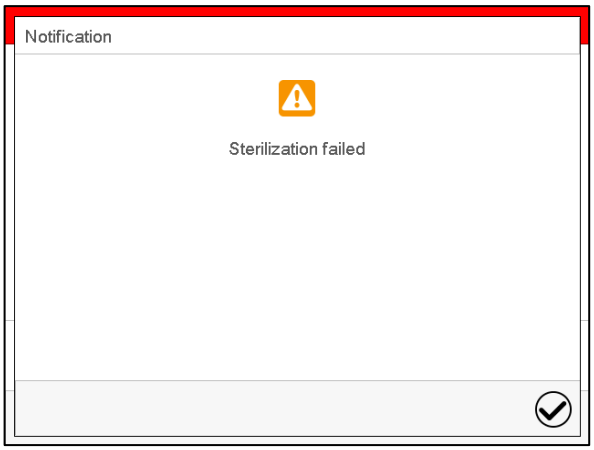
Prematurely terminating the sterilization cycle means terminating it before the entire 10-hour duration is completed. Whether effective sterilization has occurred depends on the time that has elapsed before.

21.3.4.1 Prematurely terminating the sterilization cycle after less than 4 hours: Ineffective sterilization

After prematurely terminating the sterilization cycle after less than 4 hours, the information “Sterilization failed” is shown on the controller display.

The interior may still be hot. Do not touch the glass door and inner surfaces!

Confirm the message with the ***Confirm*** icon.



After confirming the message the controller changes to Fixed value operation mode. The setpoints of Fixed value operation mode are then equilibrated.

	CO_2 / O_2 control is deactivated and will only be activated after confirming the information message “Sterilization failed” and when the temperature has cooled down to a value below < 80 °C.

When prematurely terminating the sterilization cycle, it may be that the cells/pathogens inside the chamber have not all been killed. If necessary, you should repeat the sterilization.

	NOTICE
	Danger of interrupting the temperature reaction time by prematurely terminating the sterilization. **Ineffective sterilization.** ➢ If necessary, repeat the sterilization.

The glass door and inner chamber become hot during sterilization.

	CAUTION
	Danger of burning by touching hot chamber parts during or after a sterilization. **Burns.** ∅ Do NOT touch the glass door and inner surfaces for approx. 7 hours after prematurely terminating the sterilization cycle.

21.3.4.2 Prematurely terminating the sterilization cycle after more than 4 hours, i.e., during the cooling-down phase: successful sterilization

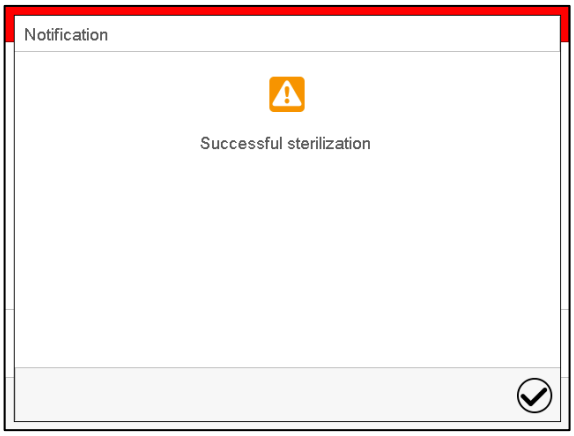
The duration of the entire sterilization is 10 hours. If you want to shorten the sterilization procedure in order to save time, you can prematurely terminate it during the cooling-down phase, i.e. no sooner than after 4 hours. At this point, the inner temperature is still approx. 140 °C / *284 °F.*

The effective sterilization phase (heating up and holding phase) is automatically finished after 4 hours The chamber is in the cooling-down phase, meaning that the necessary duration for the proper sterilization has occurred.

The information “Successful sterilization” on the controller display indicates a successful hot-air sterilization.

The interior may still be hot. Do not touch the glass door and inner surfaces!

Confirm the message with the ***Confirm*** icon.



After confirming the message the controller changes to Fixed value operation mode. The setpoints of Fixed value operation mode are then equilibrated.

	CO_2 / O_2 control is deactivated and will only be activated after confirming the information message “Successful sterilization” and when the temperature has cooled down to a value below < 80 °C.

If you prefer accelerating cooling-down, proceed as follows:

- If required, open the outer door.
- Cooling-down time:
  - Front door open: at least 1 hour
  - Front door closed: at least 4 hours
- If required, open the glass door.

Glass door and inner chamber become hot during sterilization. The glass door handle reaches a temperature of approx. 150 °C / *302 °F.*

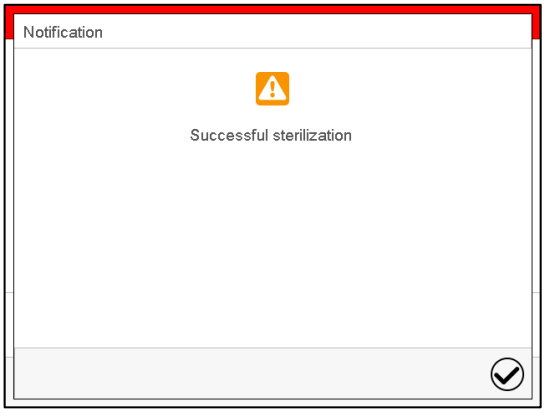
	CAUTION
	Danger of burning through touching the glass door and inner chamber during or after a sterilization. **Burns.** ∅ Do NOT touch the glass door and inner surfaces. ➢ Use gloves or a tool (e.g. pincers) to open the glass door.

21.3.5 Completing the entire sterilization cycle

The effective sterilization phase (heating up and holding phase) is automatically finished after 4 hours.

Now the information “Successful sterilization” on the controller display indicates a successful hot-air sterilization.

Confirm the message with the ***Confirm*** icon.



It is followed by a defined 6-hours cooling down phase until 37 °C / *98.6 °F* is reached. After this sterilization cycle of 10 hours in total, the controller changes to fixed value operation mode and equilibrates to the set-point which has been entered there (e.g., 37 °C / *98.6 °F*).

	CO_2 / O_2 control is deactivated and will only be activated after confirming the information message “Successful sterilization” and when the temperature has cooled down to a value below < 80 °C.

22. Maintenance and service, troubleshooting, repair, testing

22.1 General information, personnel qualification

- **Maintenance**

  See chap. 22.5.

- **Simple troubleshooting**

  Chap. 22.6 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. 1.1.

- **Detailed troubleshooting**

  If errors cannot be identified with simple troubleshooting, further troubleshooting must be performed by BINDER Service or by BINDER qualified service partners or technicians, in accordance with the description in the Service Manual.

  For personnel requirements please refer to the Service Manual.

- **Repair**

  Repair of the chamber can be performed by BINDER Service or by BINDER qualified service partners or technicians, in accordance with the description in the Service Manual.

  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/VDE 0701 and EN 50699/VDE 0702 in accordance with the details in the Service Manual.

  For personnel requirements please refer to the Service Manual.

22.2 CBF / CBF-UL: Replacing components of the humidifying / dehumidifying system

22.2.1 Replacing the silicone tube of the fresh water supply system

The silicone tube 3/5 mm is included in various lengths with the following humidifying sets:

- Tubular bag set with 3 tubular bags (art. no. 8012-2256, accessory): 3 pc. 25 cm silicone tube 3/5 mm (art. no. 6008-0320 (chap. 4.5.2)
- Tubular bag set with 12 tubular bags (art. no. 8012-2255, accessory): 12 pc. 25 cm silicone tube 3/5 mm (art. no. 6008-0320 (chap. 4.5.2)
- BINDER water set (art. no. 8009-1104, accessory): 3 pc. 25 cm silicone tube 3/5 mm for the pump (art. no. 6008-0320 (chap. 4.5.2)
- Water container set (art. no. 8009-1128, accessory): 10 m silicone tube 3/5 mm (Art. Nr. 6008-0311 (chap. 4.5.4)

To replace the silicone tube, proceed as described in chap. 4.5.

22.2.2 Replacing the pump head of the fresh water supply system

A pump head for the tube pump for freshwater supply is available under art.no. 5013-0204. To replace the pump head, proceed as described in chap. 4.5.

22.2.3 Replacing the gas fine filter (sterile filter) for ambient air

The air tube for inlet of the ambient air is located in the upper right corner in the recess for the freshwater bag. We recommend replacing the gas fine filter (sterile filter) on this tube about once a month. To do this, hold the sterile filter and pull out a bit the air tube connected to it. Unscrew the filter and screw on a new filter. Then push the tube back in.

Figure 53: Location of the gas fine filter (sterile filter) in the recess for the freshwater bag

22.3 Replacing the CO_2 und O_2/N_2 gas inlet fine filters (sterile filters)

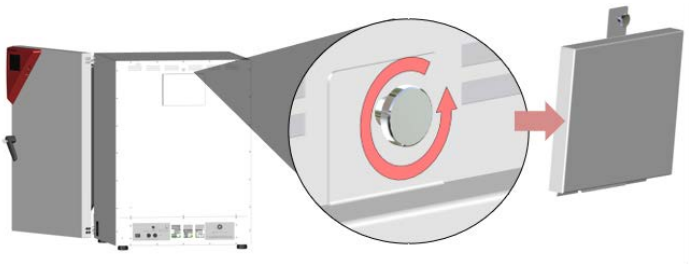
When the chamber is in operation, the incoming gas passes through a fine gas filter (aseptic filter, filtration efficiency 99.99 %, particle size 0.45 µm).This fine filter prevents dirt accumulating in the gas inlet valves and the tubes leading into the inner chamber, which could be in the gas cylinder or in the supply tubes.

When using gas with a technical grade of 99.5 %, we recommend changing the fine gas filter once a year. Please consult BINDER Service. When using gases with less pureness, the changing intervals should be shorter.

- Pull the power plug.

	CAUTION
	Risk of injuries by sharp edges on the rear panel. **Cuts.** ➢ Wear protective gloves when removing or installing the cover on the chamber rear

Remove the cover on the chamber rear



(14) CO_2 sensor

(15) Gas fine filter (sterile filter) for CO_2

(16) Gas fine filter (sterile filter) for N_2 (chamber with O_2 control)

Figure 54: Position of the CO_2 sensor and the gas fine filters behind the cover

- Unscrew the desired gas fine filter on both sides from the gas tubes and then screw on a new filter.
- Reinstall the cover on the chamber rear.

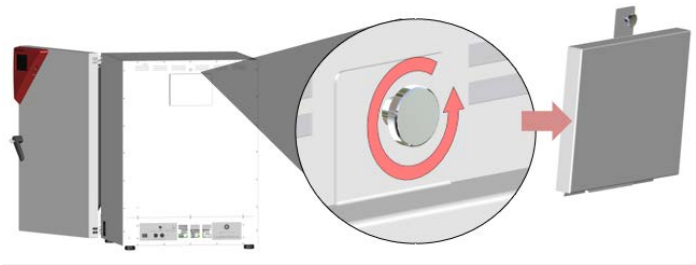
22.4 Replacing the CO_2 sensor

- Pull the power plug.

	CAUTION
	Risk of injuries by sharp edges on the rear panel. **Cuts.** ➢ Wear protective gloves when removing or installing the cover on the chamber rear

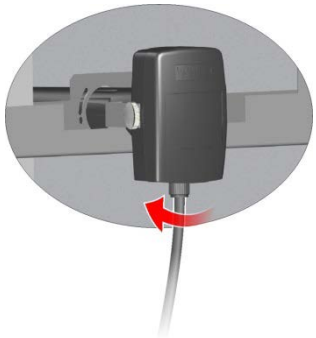
- Remove the cover on the chamber rear

  The position of the CO_2 sensor behind the cover is shown in Figure 54.

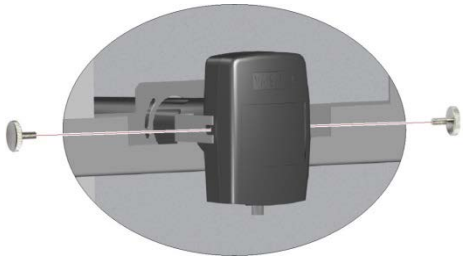


- Unscrew the cable from the sensor.

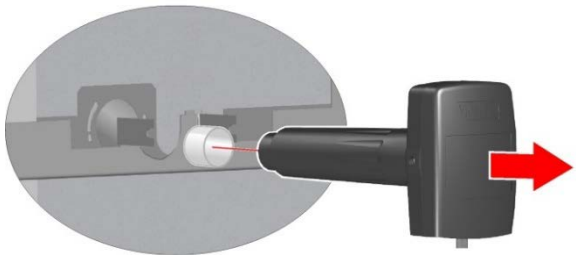
  Make sure that the sensor cable does not fall into the inner chamber.



- Remove the fixing screws on both sides of the sensor.



- Pull the sensor backwards out of the holder. The filter (white) attached to the sensor is pulled out together with the sensor.



- Then mount the new sensor proceeding in reverse order
- Reinstall the cover on the chamber rear.

	The sensor may only be used with the attached filter. After replacing the CO_2 sensor repeat the CO_2 calibration.

22.5 Maintenance intervals, service

	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. ➢ Before conducting maintenance work, turn off the chamber at the main power switch and disconnect the power plug. ➢ Make sure that any maintenance work will be conducted by licensed electricians or experts authorized by BINDER.

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.

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

CBF / CBF-UL: Have conducted regular maintenance work on the steam humidifier at least once a year. The operating behavior and the maintenance intervals of the humidifier essentially depend on the available water quality and the amount of steam produced in the meantime.

	Replace the door gasket only when cold. Otherwise, the door gasket may become damaged.

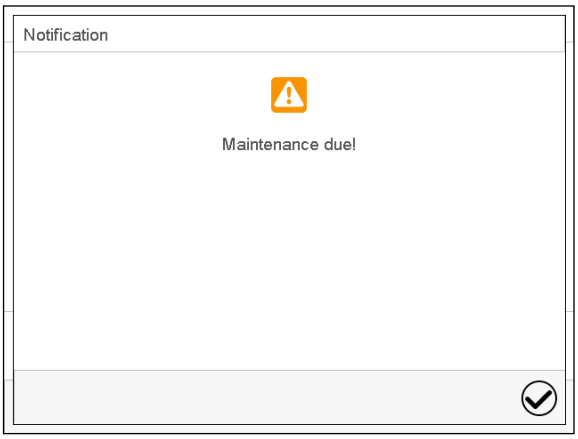
We recommend taking out a maintenance agreement. Please consult BINDER Service.

BINDER telephone hotline:	+49 (0) 7462 2005 555
BINDER fax hotline:	+49 (0) 7462 2005 93555
BINDER service hotline USA:	+1 866 885 9794 or +1 631 224 4340 x3 (toll-free in the USA)
BINDER service hotline Asia Pacific:	+852 390 705 04 or +852 390 705 03
BINDER Internet website	www.binder-world.com
BINDER address	BINDER GmbH, post office box 102, 78502 Tuttlingen, Germany

International customers, please contact your local BINDER distributor.

	The gas sensors are especially adjusted for the individual incubator. When exchanging a sensor, you must repeat control adjustment for CO_2 and O_2 (chamber with O_2 control).

After 8760 operating hours or two years the following message appears:



After confirmation with the ***Confirm*** icon, the message window will pop up again every two weeks until it is reset by BINDER Service.

22.6 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 are is a technical fault or shortcoming, take the chamber out of operation and inform BINDER Service. 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 BINDER Service.

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

22.6.1 General

Fault description	Possible cause	Required measures
Chamber without function.	No power supply.	Check connection to power supply.
		Check whether the chamber is turned on at the main power switch.
	Wrong voltage.	Check power supply for voltage of 100-120V or 200-240V.
	Chamber fuse has responded.	Check chamber fuse and replace it if appropriate. If it responds again, contact BINDER service.
	Controller defective.	Contact BINDER service.
	Nominal temperature exceeded by 10 °C due to chamber failure. Over temperature protective device (class 1) responds.	

22.6.2 Heating

Fault description	Possible cause	Required measures
Excess temperature. Having reached the setpoint, the temperature exceeds the setpoint by more than the set tolerance range value (more than 10 min.) Alarm message “Temp. range”	Site of installation too warm. Difference between the set temperature and the ambient temperature too low.	Acknowledge the alarm on the controller. Observe the difference between the set temperature and the ambient temperature, see technical data chap. 24.4.
	Controller defective.	Acknowledge the alarm on the controller. Contact BINDER service.
	Semiconductor relay defective	
	Temperature controller not adjusted.	Acknowledge the alarm on the controller. Calibrate and adjust the temperature controller.
Excess temperature. Overtemperature safety controller class 3.1 responds. Alarm message “Safety controller”	Safety controller setpoint value exceeded.	Acknowledge the alarm on the controller. Check setting of temperature setpoint and of the safety controller class 3.1 setpoint. If appropriate, select suitable value.
	Too much external heat load.	Acknowledge the alarm on the controller. Reduce heat load.
	Controller defective.	Acknowledge the alarm on the controller. Contact BINDER service.
	Semiconductor relay defective	
	Safety controller defective.	
Too low temperature. Having reached the setpoint, the temperature falls below the setpoint by more than the set tolerance range value (more than 10 min.) ***or*** the temperature doesn’t reach the tolerance range within 3 hours from turning on the chamber or closing the door. Alarm message “Temp. range”	Chamber door not properly closed.	Acknowledge the alarm on the controller. Completely close chamber door.
	Door gaskets defective.	Acknowledge the alarm on the controller. Replace door gasket.
	Controller defective.	Acknowledge the alarm on the controller. Check the function of the temperature controller.
	Door gasket defective.	Replace door gasket.
	Temperature controller not adjusted.	Calibrate and adjust the temperature controller.

Fault description	Possible cause	Required measures
Chamber doesn't heat up. Alarm message "Safety controller"""	Inner chamber temperature has reached the safety controller setpoint. Safety controller set too low.	Acknowledge the alarm on the controller. Check temperature setpoint setting. If appropriate, select suitable safety controller setpoint (chap. 12.2).
	Safety controller defective.	Acknowledge the alarm on the controller. Contact BINDER service.
Chamber doesn't heat up.	Pt 100 sensor defective.	Contact BINDER service.
	Heating element defective.	
	Semiconductor relay defective.	
	Controller defective.	
Very long heating-up times.	Chamber fully loaded.	Load the chamber less or consider longer heating-up times.
The displayed actual temperature value deviates largely compared with a reference method..	Temperature control not adjusted.	Calibrate and adjust the temperature control.
	Temperature sensor defective.	Transfer the cultures to another incubator and contact BINDER Service.

22.6.3 Gas cylinder pressure too low

The alarm messages indicate that the pressure in the supply lines of CO_2, O_2 (chamber with O_2 control) and N_2 (chamber with O_2 control) has dropped below 0.3 bar. If no gas cylinder changer is installed, the gas cylinder must be replaced. Observe the safety instructions and the maximum outlet pressure (chap. 4.4).

	Prerequisite for pressure alarm messages for O_2 and N_2 (chamber with O_2 control) is that the O_2 / N_2 control with the respective alarms are activated (chap. 6.7, 7.3).

Note: The recovery times of the gas concentrations inside the chamber following door opening, which are indicated in the technical data (chap. 24.4), refer to a connection pressure of 2.0 bar / *29 psi*. Decreasing supply pressure down to the shift point (alarm point) of 0.3 bar / *4.4 psi* results in longer recovery times. Check the pressure displays of your gas supply. If very short recovery times are required or the door is opened frequently, replace the gas cylinders promptly when the pressure decreases below 2.0 bar / *29 psi*.

Fault description	Possible cause	Required measures
Low CO_2 outlet pressure (< 0.3 bar) Alarm message "CO2 pressure"	CO_2 cylinder is not connected correctly.	Acknowledge the alarm on the controller. Correctly connect the gas cylinder.
	Connected gas cylinder is closed.	Acknowledge the alarm on the controller. Open the gas cylinder.
	Connected gas cylinder is empty.	Acknowledge the alarm on the controller. Replace the gas cylinder. Observe the safety instructions and the maximum outlet pressure (chap. 4.4).
	Gas hose is dirty or obstructed.	Acknowledge the alarm on the controller. Turn off the gas supply and remove the gas connections. Check the tube system for dirt accumulation or obstruction, clean or replace it.
	Controller malfunction.	Acknowledge the alarm on the controller. If necessary, contact BINDER Service.
	Pressure sensor system defective.	Acknowledge the alarm on the controller. Contact BINDER Service.

Fault description	Possible cause	Required measures
Chamber with O_2 control: Low O_2 outlet pressure (< 0.3 bar). Alarm message "O2 pressure"	O_2 cylinder is not connected correctly.	Acknowledge the alarm on the controller. Correctly connect the gas cylinder.
	Connected gas cylinder is closed.	Acknowledge the alarm on the controller. Open the gas cylinder.
	Connected gas cylinder is empty.	Acknowledge the alarm on the controller. Replace the gas cylinder. Observe the safety instructions and the maximum outlet pressure (chap. 4.4).
	Gas hose is dirty or obstructed.	Acknowledge the alarm on the controller. Turn off the gas supply and remove the gas connections. Check the tube system for dirt accumulation or obstruction, clean or replace it.
	Controller malfunction	Acknowledge the alarm on the controller. If necessary, contact BINDER Service.
	Pressure sensor system defective.	Acknowledge the alarm on the controller. Contact BINDER Service.
Chamber with O_2 control: Low N_2 outlet pressure (< 0.3 bar). Alarm message "N2 pressure"	N_2 cylinder is not connected correctly.	Acknowledge the alarm on the controller. Correctly connect the gas cylinder.
	Connected gas cylinder is closed.	Acknowledge the alarm on the controller. Open the gas cylinder.
	Connected gas cylinder is empty.	Acknowledge the alarm on the controller. Replace the gas cylinder. Observe the safety instructions and the maximum outlet pressure (chap. 4.4).
	Gas hose is dirty or obstructed.	Acknowledge the alarm on the controller. Turn off the gas supply and remove the gas connections. Check the tube system for dirt accumulation or obstruction, clean or replace it.
	Controller malfunction	Acknowledge the alarm on the controller. If necessary, contact BINDER Service.
	Pressure sensor system defective.	Acknowledge the alarm on the controller. Contact BINDER Service.

22.6.4 Gas control

Fault description	Possible cause	Required measures
Excess CO_2 concentration. Having reached the setpoint, CO_2 exceeds the setpoint by more than the set tolerance range value (more than 10 min.) Alarm message "CO2 range"	Temporary disturbance of the CO_2control.	Acknowledge the alarm on the controller. Turn off the chamber. Open the chamber doors for approx. 5 minutes. Observe the general information for safe handling of CO_2 (chap. 1.9). Turn on the chamber again. Upon renewed alarm, contact BINDER service.
	CO_2 sensor defective.	Acknowledge the alarm on the controller. Contact BINDER Service. To replace the sensor proceed as described in chap. 22.4.

Fault description	Possible cause	Required measures
Chamber with O_2 control: **Excess O_2 concentration.** Having reached the setpoint, O_2 exceeds the setpoint by more than the set tolerance range value (more than 10 min.) (O_2 control option) Alarm message "O_2 range"	Temporary disturbance of the O_2control.	Acknowledge the alarm on the controller. Turn off the chamber. Open the chamber doors for approx. 5 minutes. Observe the general information for safe handling of oxygen (chap. 1.9).. Prevent oxygen enrichment in the ambiance of the chamber. Turn on the chamber again. Upon renewed alarm, contact BINDER service.
	O_2 sensor defective.	Acknowledge the alarm on the controller. Contact BINDER Service.
Recovery time (up to 5 vol.-% CO_2) after doors were open for 2 minutes is < 2 minutes	CO_2 sensor system defective.	Contact BINDER Service.
Too low CO_2 concentration. Having reached the setpoint, CO_2 falls below the setpoint by more than the set tolerance range value (more than 10 min.) ***or*** CO_2 doesn't reach the tolerance range within 3 hours from turning on the chamber or closing the door. Alarm message "CO_2 range"	Temporary disturbance of the CO_2control.	Acknowledge the alarm on the controller. Turn off the chamber. After approx. 5 minutes turn on the chamber again. Upon renewed alarm, contact BINDER service.
	CO_2 sensor defective.	Acknowledge the alarm on the controller. Contact BINDER Service. To replace the sensor proceed as described in chap. 22.4.
Chamber with O_2 control: **Too low O_2 concentration.** Having reached the setpoint, O_2 falls below the setpoint by more than the set tolerance range value (more than 10 min.) ***or*** O_2 doesn't reach the tolerance range within 3 hours from turning on the chamber or closing the door. Alarm message "O_2 range".	Temporary disturbance of the O_2control.	Acknowledge the alarm on the controller. Turn off the chamber. After approx. 5 minutes turn on the chamber again. Upon renewed alarm, contact BINDER service.
	O_2 sensor defective.	Acknowledge the alarm on the controller. Contact BINDER Service.
Too low gas concentration. The concentration of CO_2 or O_2 (chamber with O_2 control) does not reach the adjusted set value.	Door gaskets defective.	Replace door gaskets
	Doors not closed properly.	Close door properly.
	Connected gas cylinder is empty or not opened.	Open or replace gas cylinder.
	Gas cylinder is not connected correctly.	Correctly connect the gas cylinder.
	Gas hose is dirty or obstructed.	Check the tube system for dirt accumulation or obstruction, clean or replace it.
Recovery time (up to 5 vol.-% CO_2) after doors were open for 2 minutes is > 10 minutes.	Obstructed gas supply.	Check gas supply (cylinder, connections, hose system).
	Insufficient CO_2 input pressure	
Unusually high gas consumption.	Door gaskets defective.	Replace door gaskets
	Gas sensor not adjusted.	Calibrate the sensor.
	Gas sensor defective.	Contact BINDER Service
	Gas fine filter not connected correctly.	

Fault description	Possible cause	Required measures
The displayed actual value of CO_2 deviates largely compared with a reference method.. The pH indicator of the cell culture medium changes its normal color.	CO_2 control not adjusted.	Calibrate and adjust CO_2 control.
	CO_2 sensor defective.	Transfer the cultures to another incubator and contact BINDER Service. To replace the sensor proceed as described in chap. 22.4.
Chamber with O_2 control: The displayed actual value of O_2 (option) deviates largely compared with a reference method.	O_2 control not adjusted.	Calibrate and adjust O_2 control.
	O_2 sensor defective.	Transfer the cultures to another incubator and contact BINDER Service.
No gas control after hot-air sterilization.	Sterilization cycle still running.	Terminate hot-air sterilization.
	Information message not confirmed.	Confirm the information message with “Ok”.
	Inner chamber temperature above 80 °C	Let the inner chamber temperature decrease below 80 °C.
Condensation on the glass door and on the CO_2 sensor head under the filter cap. Alarm message: “CO2 sensor not ready”. After 6 hours with no user reaction, this message is replaced by the alarm message: “CO2 sensor fault”.	Outer door open and inner glass door closed for more than 5 minutes	Acknowledge the alarm on the controller. Remove the filter cap and let it dry until there is no visible condensation. Plug on the filter cap. *If after drying the alarm message reappears*, contact BINDER Service.
	Power failure for more than 5 minutes	
	CO_2 sensor defective	Acknowledge the alarm on the controller. Contact BINDER Service. To replace the sensor proceed as described in chap. 22.4.

22.6.5 Sterilization

Indication	Possible cause	Required measures
The sterilization is running. Alarm message “Sterilization”.	Sterilization cycle is running	Acknowledge the alarm on the controller. Do not open the door.

22.6.6 Humidity (CB / CB-UL)

Fault description	Possible cause	Required measures
Condensations inside the chamber.	Permadry™ pan filled with water when the chamber is not operating.	Empty Permadry™ pan when the chamber is not operating.
	Door gaskets defective.	Replace door gaskets
	Doors not closed properly.	Close door properly.
	Humidity set too high.	Reduce humidity (chap. 6.8)
Condensation on the doors or on the optional divided inner door.	Chamber placed on very cold floor.	Place the chamber on a BINDER stand to increase the distance to the floor.
	Door gaskets defective.	Replace door gaskets
	Doors not closed properly.	Close door properly.
	Humidity set too high.	Reduce humidity (chap. 6.8)
	Door heating set too low.	Contact BINDER Service to adjust the door heating

Fault description	Possible cause	Required measures
Too low humidity inside.	Humidity set too low.	Increase humidity (chap. 6.8)
	Chamber door not properly closed.	Completely close chamber door.
	Door gasket defective.	Replace door gasket.
	Permadry™ pan empty.	Fill the outer Permadry™ pan with water up to the marking on the inner pan with distilled, sterile water. The pan must have thorough contact to the bottom of the inner chamber, see chap. 4.2.

22.6.7 Humidity (CBF / CBF-UL)

Fault description	Possible cause	Required measures
Humidity fluctuation: Control accuracy of +/- 3 % r.h. is not reached.	Door gasket defective.	Replace door gasket.
	Door opened very frequently.	Open doors less frequently.
Humidity fluctuation, together with temperature fluctuation > 1 °C with a set-point approx. 3 °C above ambient temperature.	Place of installation too hot.	Select cooler place of installation or contact BINDER service.
Alarm message “Humidity system”.	Humidity module defective.	Acknowledge the alarm on the controller. Contact BINDER service.
Alarm message “Freshwater supply”.	Freshwater bag is empty or contains air.	Acknowledge the alarm on the controller. Fill the freshwater bag correctly.
	The silicon tube is not correctly inserted into the pump.	Acknowledge the alarm on the controller. Place the silicon tube correctly (chap. 4.5.2).
	Silicon tube kinked.	
Too high humidity inside the chamber (exceeding the set-point)	Ambient humidity too high at site of installation	Possible dehumidification depends on ambient humidity. Select installation site with lower humidity.

22.6.8 Controller

Fault description	Possible cause	Required measures
No chamber function (dark display).	Display in standby mode.	Press on touchscreen.
	Main power switch turned off.	Turn on the main power switch.
Menu functions not available.	Menu functions not available with current authorization level.	Log in with the required higher authorization. or contact BINDER service to obtain an activation code (chap. 13.6).
No access to controller	Password incorrect.	Contact BINDER service.
Chart recorder function: measured-value memory cleared; information lost.	New setting of storage rate or scaling (minimum and/or maximum) (chap. 16.2).	Change the storage rate or scaling ONLY if the previously registered data are no longer required.

Fault description	Possible cause	Required measures
Controller does not equilibrate to setpoints entered in Fixed value operation mode	Controller is not in Fixed value operation mode.	Change to Fixed value operation mode.
	CO_2 control is deactivated.	Activate CO_2 control (chap. 6.7).
	Chamber with O_2 control: O_2 control is deactivated.	Activate O_2 control (chap. 6.7).
	CBF / CBF-UL: Humidity control is deactivated.	Activate humidity control (chap. 6.7).
Controller does not equilibrate to program set-points.	Controller is not in program operation mode, or program delay time is running.	Start the program again. If appropriate, wait for the program delay time.
Program duration longer than programmed.	Tolerances have been programmed.	For rapid transition phases, do NOT program tolerance limits in order to permit maximum speed for heating, gas control or humidification.
Program keeps the last program setpoint constant while in setting “ramp”.	Program line with setting “ramp” is incomplete.	When programming with setting “ramp”, define the end value of the desired cycle by adding an additional section with a section time of at least one second.
Ramp temperature transitions are only realized as steps.	Setting “step” has been selected.	Select setting “ramp”.
CBF / CBF-UL: Humidity alarm when operating without water supply.	Humidity control is activated.	Deactivate humidity control (chap. 6.7).
Acknowledging the alarm does not cancel the alarm state.	Cause of alarm persists.	Remove cause of alarm. If the alarm state continues, contact BINDER service.
Alarm message: **- - - -** *or* **<-<-<** *or* **>->->**	Sensor rupture between sensor and controller or Pt 100 sensor defective.	Contact BINDER service.

22.6.9 Open door

Indication	Possible cause	Required measures
Outer door open (longer than the selected alarm delay time) Alarm message “Door open”.	Outer door open or not properly closed.	Acknowledge the alarm on the controller. Close the door. The triggered zero-voltage relay alarm contact switches back.

22.7 Sending the chamber back to BINDER GmbH

If you return a BINDER product to us for repair or any other reason, we will only accept the product upon presentation of an **authorization number** (RMA number) that has previously been issued to you. An authorization number will be issued after receiving your complaint either in writing or by telephone **prior** to your sending the BINDER product back to us. The authorization number will be issued following receipt of the information below:

- BINDER product type and serial number
- Date of purchase
- Name and address of the dealer from which you bought the BINDER product
- Exact description of the defect or fault
- Complete address, contact person and availability of that person
- Exact location of the BINDER product in your facility
- A contamination clearance certificate (chap. 26) must be faxed in advance

The authorization number must be applied to the packaging in such a way that it can be easily recognized or be recorded clearly in the delivery documents.

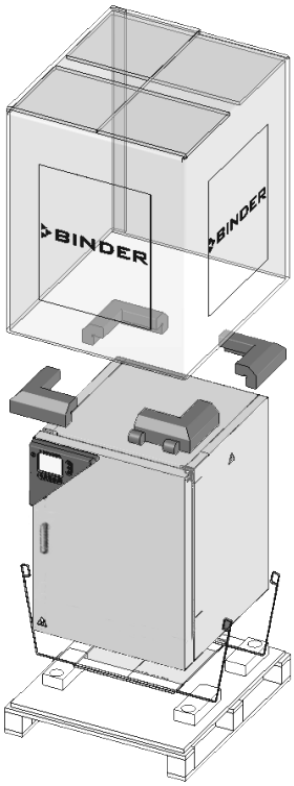
	For security reasons we cannot accept a chamber delivery if it does not carry an authorization number.

Return address: BINDER GmbH, Abteilung Service, Gänsäcker 16, 78502 Tuttlingen, Germany

23. Disposal

23.1 Disposal of the transport packing

23.1.1 Outer chamber packing

Packing element		Material	Disposal
	Straps to fix packing on pallet (no image)	Plastic	Plastic recycling
	Shipping box	Cardboard	Paper recycling
	Edge stuffing, top	PE foam	Plastic recycling
	Pallet with foamed plastic stuffing	PE foam	Plastic recycling
		Solid wood (IPPC standard)	Wood recycling

23.1.2 Packing inside the chamber and equipment

Packing element	Material	Disposal
Door protection	PE foam	Plastic recycling
Packing box equipment	Cardboard	Paper recycling
Insulating air cushion foil	PE foil	Plastic recycling
Bag for operating manuals	PE foil	Plastic recycling

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

23.2 Decommissioning

- Turn off the chamber at the main power switch and disconnect it from the power supply (pull the power plug).

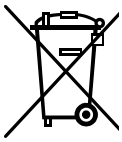
☞	When switching off the main power switch, the stored parameters remain saved.

- Turn off the CO_2 supply and the O_2 / N_2 supplies (chamber with O_2 control). Remove the gas connections.
- CBF / CBF-UL: Empty the freshwater bag.
- Let the inner chamber sufficiently cool down after a hot-air sterilization before removing any parts.
- CB/CB-UL: The Permadry™ water pan must not remain filled while the chamber is out of operation. Otherwise condensation on the inner surfaces and the CO_2 sensor head may occur. In this case, clean and dry the chamber with doors open for at least one hour before restarting the chamber. BINDER recommends performing a hot air sterilization of the chamber before commissioning.
- Temporal decommissioning: See indications for appropriate storage, chap. 3.3.
- Final decommissioning: Dispose of the chamber as described in chap. 23.3 to 23.5.
- When restarting the chamber, please pay attention to the corresponding safety information.

23.3 Disposal of the chamber in the Federal Republic of Germany

According to Annex I of Directive 2012/19/EU of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE), BINDER devices are classified as “monitoring and control instruments” (category 9) only intended for professional use“. They must not be disposed of at public collecting points.

The chambers bear the symbol for the marking of electrical and electronic equipment manufactured / placed on the market in the EU after 13 August 2005 and be disposed of in separate collection according to Directive 2012/19/EU on waste electrical and electronic equipment (WEEE) and German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG). WEEE marking: crossed-out wheeled bin. A significant part of the materials must be recycled in order to protect the environment.



At the end of the device’s service life, have the chamber disposed of according to the German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG from 20 October 2015, BGBl. I p. 1739) or contact BINDER service who will organize taking back and disposal of the chamber according to the German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG from 20 October 2015, BGBl. I p. 1739).

	NOTICE
	Danger of violation against existing law if not disposed of properly. **Failure to comply with applicable law.** ∅ Do NOT dispose of BINDER devices at public collecting points. ➢ Have the device disposed of professionally at a recycling company which is certified according to the German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG from 20 October 2015, BGBl. I p. 1739). *or* ➢ Instruct BINDER Service to dispose of the device. The general terms of payment and delivery of BINDER GmbH apply, which were valid at the time of purchasing the chamber.

Certified companies disassemble waste (used) BINDER equipment in primary substances for recycling according to Directive 2012/19/EU. The devices must be free from toxic, infectious or radioactive substances in order to eliminate any health hazards to the employees of the recycling companies.

- Prior to handing the chamber over to a recycling company, it is the user's responsibility that it is free from toxic, infectious or radioactive substances.
- Prior to disposal, clean all introduced or residual toxic substances from the chamber.
- Prior to disposal, disinfect the chamber from all sources of infection. Be aware that sources of infection may also be located outside the inner chamber.
- If you cannot safely remove all toxic substances and sources of infection from the chamber, dispose of it as special waste according to national law.
- Fill out the contamination clearance certificate (chap. 26) and enclose it with the chamber.

WARNING

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

Damages to health.

∅ NEVER take a chamber contaminated with toxic substances or sources of infection for recycling according to Directive 2012/19/EU.

➢ Prior to disposal, remove all toxic substances and sources of infection from the chamber.

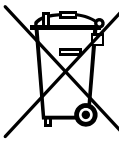
➢ A chamber from which all toxic substances or sources of infection cannot be safely removed must be considered as "special" waste according to national law. Dispose of it accordingly.

The main board of the chamber includes a lithium cell. As the end user, you are legally obliged to return used batteries. Old batteries and rechargeable batteries must not be disposed of with household waste. They can be handed in free of charge at the community's public collection points and wherever batteries and accumulators of the type in question are sold.

23.4 Disposal of the chamber in the member states of the EU except for the Federal Republic of Germany

According to Annex I of Directive 2012/19/EU of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE), BINDER devices are classified as "monitoring and control instruments" (category 9) only intended for professional use". They must not be disposed of at public collecting points.

The chambers bear the symbol for the marking of electrical and electronic equipment manufactured / placed on the market in the EC after 13 August 2005 and be disposed of in separate collection according to the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE). WEEE marking: crossed-out wheeled bin.



At the end of the device's service life, notify the distributor who sold you the device, who will take back and dispose of the chamber according to the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE).

	NOTICE **Danger of violation against existing law if not disposed of properly.** **Failure to comply with applicable law.** ∅ Do NOT dispose of BINDER devices at public collecting points. ➢ Have the device disposed of professionally at a recycling company that is certified according to conversion of the Directive 2012/19/EU into national law. *or* ➢ Instruct the distributor who sold you the device to dispose of it. The agreements apply that were agreed with the distributor when purchasing the chamber (e.g. his general terms of payment and delivery). ➢ If your distributor is not able to take back and dispose of the chamber, please contact BINDER service.

Certified companies disassemble waste (used) BINDER equipment in primary substances for recycling according to Directive 2012/19/EU. The devices must be free from toxic, infectious or radioactive substances in order to eliminate any health hazards to the employees of the recycling companies.

	• Prior to handing the chamber over to a recycling company, it is the user's responsibility that it is free from toxic, infectious or radioactive substances. • Prior to disposal, clean all introduced or residual toxic substances from the chamber. • Prior to disposal, disinfect the chamber from all sources of infection. Be aware that sources of infection may also be located outside the inner chamber. • If you cannot safely remove all sources of infection and toxic substances from the chamber, dispose of it as special waste according to national law. • Fill out the contamination clearance certificate (chap. 26) and enclose it with the chamber.

 	WARNING **Danger of intoxication and infection through contamination of the chamber with toxic, infectious or radioactive substances.** **Damages to health.** ∅ NEVER take a chamber contaminated with toxic substances or sources of infection for recycling according to Directive 2012/19/EU. ➢ Prior to disposal, remove all toxic substances and sources of infection from the chamber. ➢ A chamber from which all toxic substances or sources of infection cannot be safely removed must be considered as "special" waste according to national law. Dispose of it accordingly.

The main board of the chamber includes a lithium cell. The disposal of batteries within the EU must be carried out in accordance with the current EU directives as well as national, regional and local environmental protection regulations.

23.5 Disposal of the chamber in non-member states of the EU

	NOTICE
	Danger of violation against existing law if not disposed of properly. **Failure to comply with applicable law. Alteration of the environment.** ➢ For final decommissioning and disposal of the chamber, please contact BINDER service. ➢ Follow the statutory regulations for appropriate, environmentally friendly disposal.

The main board of the chamber includes a lithium cell. Used batteries must be disposed of properly. Please ensure that you dispose of the battery in accordance with the regulations in force in your country.

24. Technical description

24.1 Factory calibration and adjustment

This chamber was calibrated and adjusted in the factory. Calibration and adjustment were performed using standardized test instructions, according to the QM DIN EN ISO 9001 system applied by BINDER (certified since December 1996 by TÜV CERT). All test equipment used is subject to the administration of measurement and test equipment that is also a constituent part of the BINDER QM DIN EN ISO 9001 systems. They are controlled and calibrated to a DKD-Standard at regular intervals.

A record of this calibration and adjustment is part of the BINDER test certificate of the chamber.

Adjustment in factory:

- **Temperature**: 37 °C / *98.6°F* measured in the center of the usable volume
- **CO_2**: 0 vol.-% CO_2 (100 vol.-% N_2) and 5 vol.-% CO_2 (analyzed test gas directly exposed to the sensor head)
- **O_2** (chamber with O_2 control): 0 vol.-% O_2 (100 vol.-% N_2, analyzed test gas directly exposed to the sensor head) and 20.9 vol.-% O_2 (ambient air).
- **Humidity** (CBF / CBF-UL): 93 % r.h.

	Repeated calibrations are recommended in periods of 12 months.

For temperature and humidity calibration and adjustment, BINDER service uses electronic measuring and display devices traceable to an acknowledged standards/calibration institution (DKD or PTB for Germany) with a valid calibration certificate.

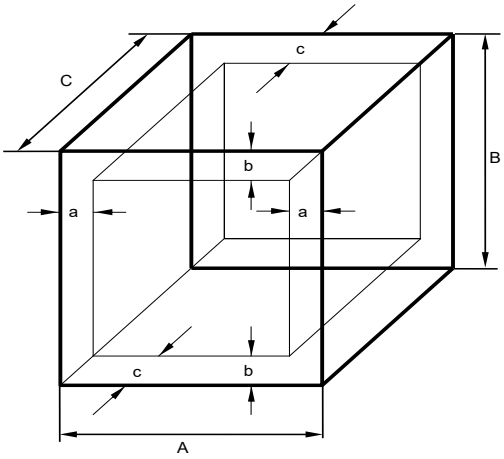
Test gases with an analyzed concentration serve to calibrate the sensor systems for CO_2 and O_2 (chamber with O_2 control). The sensor heads are exposed directly to the test gas.

24.2 Over current protection

The chamber is protected by a chamber-protection against over current, accessible from the outside. It is located at the rear of the chamber below the strain relief of the power cord. The fuse holder is equipped with a fuse clip 5mm x 20 mm (CB) or 6.3 x32 mm (CB-UL). Replace this fuse only with a substitute of the same ratings. Refer to the technical data of the respective device type. If this fuse is blown, please inform an electronic engineer or BINDER service.

24.3 Definition of usable volume

The usable volume illustrated below is calculated as follows:



A, B, C = internal dimensions (W, H, D)
a, b, c = wall separation

a = 0.1*A
b = 0.1*B
c = 0.1*C

V_{USE} = (A - 2 * a) * (B - 2 * b) * (C - 2 * c)

Figure 55: Determination of the usable volume

The technical data refers to the defined usable volume.

	Do NOT place samples outside this usable volume. Do NOT load this volume by more than half to enable sufficient airflow inside the chamber. Do NOT divide the usable volume into separate parts with large area samples. Do NOT place samples too close to each other in order to permit circulation between them and thus obtain a homogenous distribution of temperature, CO_2, O_2 (chamber with O_2 control), and humidity.

24.4 Technical data

Chamber size		**56**	**170**	**260**
Exterior dimensions				
Width, net	mm / *inch*	520 / *20.47*	680 / *26.77*	740 / *29.13*
Height including feet	mm / *inch*	675 / *26.57*	870/ *34.25*	1025 / *40.35*
Depth, net	mm / *inch*	550 / *21.65*	715 / *28.15*	775 / *30.51*
Depth plus door handle, I-triangle	mm / *inch*	55 / *2.16*	55 / *2.16*	55 / *2.16*
Depth plus power connection and gas connection	mm / *inch*	10 / *0.39*	10 / *0.39*	10 / *0.39*
Wall clearance rear (minimum)	mm / *inch*	100 / *3.94*	100 / *3.94*	100 / *3.94*
Wall clearance side (minimum)	mm / *inch*	50 / *1.97*	50 / *1.97*	50 / *1.97*
Doors				
Quantity of outer doors		1	1	1
Quantity of inner doors (inner glass door or divided inner door)		1	1	1
Quantity of individual inner glass doors (with divided inner door)		4	6	8
Interior dimensions				
Width	mm / *inch*	400 / *15.75*	560 / *22.05*	620 / *24.41*
Height	mm / *inch*	400 / *15.75*	600 / *23.62*	750 / *29.53*
Depth	mm / *inch*	330 / *12.99*	500 / *19.69*	560 / *22.05*
Interior volume	L / *cu.ft.*	53 / *1.9*	170 / *6.0*	260 / *9.2*

Chamber size			56	170	260
Shelves					
Number of shelves, regular			2	3	4
Number of shelves, max.			3	6	8
Size of shelf (external) Width x Depth		mm x mm *inch x inch*	396 x 289 *15.59 x 11.38*	551 x 442 *21.69 x 17.40*	614 x 502 *24.17 x 19.76*
Maximum load per shelf		Kg / *lbs.*	10 / *22*	10 / *22*	10 / *22*
Permitted total load		Kg / *lbs*	30 / *66*	30 / *66*	40 / *88*
Weight					
Weight (empty) CB / CB-UL		Kg / *lbs*	53 / *116.9*	95 / *209.4*	121 / *266.8*
Weight (empty) CBF / CBF-UL		Kg / *lbs*	---	97 / *213.8*	122 / *268.9*
CB / CB-UL temperature data					
Temperature range	from … degree above ambient	°C / *°F*	4 / *7.2*	4 / *7.2*	5 / *9.0*
	up to	°C / *°F*	*CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*	*CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*	*CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*
Temperature range, chamber with O_2 control	from … degree above ambient	°C / *°F*	6 / *10.8*	6 / *10.8*	6 / *10.8*
	up to	°C / *°F*	*CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*	*CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*	*CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*
Temperature fluctuation at 37 °C / *98.6 °F*		± K	0.1	0.1	0.1
Temperature uniformity (variation) at 37 °C/ *98.6 °F*		± K	0.4	0.3	0.4
Recovery time after door was opened for 30 sec at 37 °C / *98.6 °F*		minutes	5	6	6
CBF / CBF-UL temperature data					
Temperature range	from … degree above ambient	°C / *°F*	---	5 / *9*	6 / *10.8*
	up to	°C / *°F*	---	*CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*	*CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*
Temperature range, chamber with O_2 control	from … degree above ambient	°C / *°F*	---	7 / *12.6*	6 / *10.8*
	up to	°C / *°F*	---	*CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*	*CB E7:* 60 °C / *140 °F*, *CB E7.1:* 50 °C / *122 °F*
Temperature fluctuation at 37 °C / *98.6 °F*		± K	---	0.1	0.1
Temperature uniformity (variation) at 37 °C/ *98.6 °F*		± K	---	0.4	0.4
Recovery time after door was opened for 30 sec at 37 °C / *98.6 °F*		minutes	---	6	6
CO_2 data					
CO_2 range		vol.-% CO_2	0 to 20	0 to 20	0 to 20
Setting accuracy		vol.-% CO_2	0.1	0.1	0.1
CO_2 fluctuation		vol.-% CO_2	0.1	0.1	0.1
Recovery time after door was opened for 30 sec at 5 vol.-% CO_2		minutes	5	5	5

Chamber size		56	170	260
CO_2 data (continued)				
CO_2 measurement		IR	IR	IR
Connection hose nozzle DN6 for CO_2 connection to the chamber for hose with internal diameter	mm / *inch*	6 / *0.24*	6 / *0.24*	6 / *0.24*
Humidity data				
CB / CB-UL humidity range	% r.h.	90 to 95	90 to 95	90 to 95
CBF / CBF-UL humidity range	% r.h.	---	50 to 95	50 to 95
Recovery time after door was opened for 30 sec at 90 % r.h. (CBF / CBF-UL)	minutes	---	12	15
O_2 Data (chamber with O_2 control)				
O_2 range (regular hypoxic control range)	vol.-% O_2	0.2 to 20	0.2 to 20	0.2 to 20
O_2 range (optional alternative control range)	vol.-% O_2	10 to 90	10 to 90	10 to 90
Setting accuracy with inlet pressure 2 bar	vol.-% O_2	0.1	0.1	0.1
O_2 fluctuation	vol.-% O_2	0.1	0.1	0.1
Recovery time after door was opened for 30 sec at 5 vol.-% O_2	minutes	5	10	15
O_2 measurement		ZrO_2	ZrO_2	ZrO_2
Connection hose nozzle DN6 for O_2/N_2 connection to the chamber for hose with internal diameter	mm / *inch*	6 / *0.24*	6 / *0.24*	6 / *0.24*
Electrical data				
IP system of protection acc. to EN 60529	IP	20	20	20
Nominal voltage (+/-10 %) at 50 Hz power frequency	V	200-230	200-230	200-230
Nominal voltage (+/-10 %) at 60 Hz power frequency	V	200-230	200-230	200-230
Current type		1N~	1N~	1N~
CB / CB-UL nominal power	kW	0.80	1.30	1.50
CBF / CBF-UL nominal power	kW	---	1.60	1.60
Power plug (IEC connector plug)		Grounded plug IEC 7/7		
Installation category acc. to IEC 61010-1		II	II	II
Pollution degree acc. to IEC 61010-1		2	2	2
Chamber fuse 4x20mm / 250V / time-lag (T), external	Amp	10	10	10
Additional temperature fuse class 1 (DIN 12880), internal	°C	240	240	240
Different electrical data for CB-UL / CBF-UL constructed for the USA and Canada				
Nominal voltage (+/-10 %) at 50 Hz power frequency	V	100-120	100-120	100-120
Nominal voltage (+/-10 %) at 60 Hz power frequency	V	100-120	100-120	100-120
Current type		1N~	1N~	1N~
Power plug	NEMA	5-20P	5-20P	5-20P
Chamber fuse 5x20mm / 250V / time-lag (T), external	Amp	12.5	16	16
Environment-specific data				
Noise level (mean value)	dB (A)	41	41	41
Energy consumption at 37 °C/ *98.6 °F*	Wh/h	45	55	65

Notes:

- The recovery times of the gas concentrations inside the chamber after the door is opened coincide with a connection pressure of 2.0 bar / *29 psi*. Decreasing supply pressure results in longer recovery times.

- The specified recovery times can be observed with a door opening of up to 60s. If the outer door is left open for more than 3 minutes, all heaters are deactivated. It is then necessary to let the chamber equilibrate again.

All technical data is specified for unloaded chambers with standard equipment at an ambient temperature of 22 +/- 3 °C / *71.6 +/- 5.4 °F* and a power supply voltage fluctuation of +/-10%. Technical data is determined in accordance to BINDER Factory Standard Part 2:2015 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.

☞	CBF / CBF-UL: Bringing a source of humidity into the inner chamber will affect the minimum humidity specification

24.5 Equipment, options, and accessories (extract)

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

Regular equipment
Multifunction touchscreen controller MB2 for temperature, CO_2, O_2 (chamber with O_2 control) and humidity (CBF / CBF-UL)
CO_2 infra-red absorption measuring system
Silicone jacket heating
Hot-air auto sterilization
Gas mixing head
Permadry™ humidity system (CB / CB-UL)
Weldless deep-drawn polished inner chamber made of stainless steel 1.4301/V2A, polished
FailSafe – Electronic error auto-diagnosis system
Zero-voltage relay alarm output with DIN socket (6 poles), DIN plug included
Lockable door
Tightly closing inner glass door
3 perforated shelves, stainless steel 1.4301/V2A
Overtemperature safety controller class 3.1 acc. to DIN 12880:2007
CBF / CBF-UL: Microprocessor controlled humidifying system
CBF / CBF-UL : Freshwater set with 3 tubular bags incl. accessories
Chamber with O_2 control: O_2 control in the hypoxic control range 0.2 to 20 vol. % O_2.
Ethernet interface for computer communication

Options / accessories
Perforated shelf, stainless steel
Perforated shelf, full copper
Chamber with O_2 control: Alternative control range 10 to 90 vol. % O_2
Divided inner door with cell therapy compartmentation, stainless steel, 4 times (size 56), 6 times incubator (size 170), 8 times (incubator size 260)
Shelves for divided inner door, stainless steel
Partition wall for cell therapy compartmentation
Quick sample access
Stacking stand with castors lockable by breaks (incubator size 170 / 210)
Stacking adapter for direct, thermally decoupled stacking
Base with castors
Stacking adapter for combination C / C-UL 150 on top of CB / CB-UL / CBF / CBF-UL 170

Options / accessories
Silicone access ports closable with 2 silicone plugs
BINDER Gas Supply Service: External CO_2 bottle changer for CO_2 , O_2 , or N_2
Connection kit for CO_2 , O_2 or N_2 cylinder
Water tight internal socket 230 V (max. 3 A), with turn-off switch (available via BINDER INDIVIDUAL Customized Solutions)
Analog output temperature and CO_2 4-20 mA 4-20mA with DIN socket (6 poles), DIN plug included
BINDER Pure Aqua Service
Cartridge for BINDER Pure Aqua Service
Cleaning kit (neutral cleaning agent, disinfection spray and lint-free disposable wipes, gloves and goggles)
CELLROLL roller system with set of connection cables for extra-low voltage access port
Access port (8-pin) for extra-low voltage (ELV) with LEMO socket (can be covered) and LEMO connector, maximum power rating 24VAC/DC – 2.5 Amp
Gas fine filter with two connection pieces
CBF / CBF-UL: Tubular bag set incl. accessories. Set with 3 or 12 tubular bags (annual demand)
CBF / CBF-UL: BINDER water set incl. accessories
CBF / CBF-UL: Water container set incl. accessories
Qualification folder
Calibration of temperature including certificate
Calibration of CO_2 including certificate
Spatial temperature measurement including certificate
Spatial temperature measurement acc. to DIN 12880 including certificate
Chamber with O_2 control: Calibration of O_2 including certificate
CBF / CBF-UL: Calibration of humidity including certificate
CBF / CBF-UL: Spatial temperature and humidity measurement including certificate

24.6 Spare parts, options, and accessories (extract)

☞	BINDER GmbH is responsible for the safety features of the chamber only, provided skilled electricians or qualified personnel authorized by BINDER 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	**56**	**170**	**260**
Description	**Art. no.**		
Perforated shelf, stainless steel	6004-0136	6004-0137	6004-0197
Perforated shelf, full copper	---	6004-0233	---
Divided inner door with cell therapy compartmentation Variant 8612-0029 • 4 inner doors • 2 shelf levels with one partition wall each	Door hinged right: 8012-2023 Door hinged left: 8012-2026	---	---
Divided inner door with cell therapy compartmentation Variant 8612-0030 • 6 inner doors • 3 shelf levels with one partition wall each	---	Door hinged right: 8012-2024 Door hinged left: 8012-2027	---

Chamber size	56	170	260
Description	**Art. no.**		
Divided inner door with cell therapy compartmentation Variant 8612-0031 • 8 inner doors • 4 shelf levels with one partition wall each	---	---	Door hinged right: 8012-2025 Door hinged left: 8012-2028
Partition wall for cell therapy compartmentation	4020-1218	4020-1219	4020-1220
Divided shelves (1 level) for divided inner door, stainless steel	---	6004-0226	6004-0227
Extra-deep shelf for divided inner door, stainless steel	6004-0120	---	---
Door gasket for outer chamber door	6005-0294	6005-0275	6005-0296
Door gasket for inner glass door or for divided inner door	6005-0312	6005-0508	6005-0314
Door gasket for individual glass door of divided inner door	6005-0311	6005-0293	6005-0305
Individual glass door of divided inner door, complete	6005-0135	8010-0110	8010-0116
Flat stacking adapter for direct, thermally decoupled stacking	9051-0038	9051-0035	9051-0039
Stacking stand with castors lockable by breaks	---	9051-0040	9051-0041
Base with castors	9051-0043	9051-0028	9051-0044
Stacking adapter for combination C / C-UL150/160/170 on top of CB / CB-UL / CBF / CBF-UL 170	---	9051-0027	---
CELLROLL roller system with set of connection cables and extra-low voltage access port	---	8012-0571	8012-0572
Permadry™ water pan, stainless steel (CB / CB-UL)	6006-0626	4022-0081	6006-0441
Permadry™ water pan, stainless steel, with divided inner door option (CB / CB-UL)	6006-0666	---	---
Permadry™ water pan, full copper (CB / CB-UL)	---	4022-0086	---

Description	Art. no.
Plug for optional silicon access port d30	6016-0035
Gas cylinder connection kit for CO_2	8012-0014
Gas cylinder connection kit for O_2	8012-0015
Gas cylinder connection kit for N_2	8012-0016
Chamber fuse 5x20mm 250 V 10 A time-lag (T)	5006-0088
Chamber fuse 6.3x32mm 250V 12.5 A time-lag (T) for cUL version only	5006-0096
CO_2 sensor	5002-0078
O_2 sensor for chamber with regular equipment: hypoxic control range 0.2 up to 20 vol.-% O_2	5002-0084
O_2 sensor for chamber with O_2 control with optional alternative control range 10 up to 90 vol.-% O_2	5002-0085
CBF / CBF-UL : Humidity sensor	5002-0077
Gas fine filter with two connection pieces	8009-0369
CBF / CBF-UL : Fresh water bag (0.9 liters / *0.32 cu.ft.*)	6002-0626

Description	Art. no.
CBF / CBF-UL : Bag set incl. accessories with 3 empty tubular bags (3 months demand): • 3 empty tubular bags (art.no. 6002-0626. 6002-0626) • 1 two-piece tube connector with 3-5mm nozzles (art.no. 6009-0322) • 1 two-piece tube connector with 5-7mm nozzles (art.no. 6009-0323) • 3 gas fine filters (sterile filter) (art.no. 6014-0012) • 3 pc. 25 cm silicone tube (art.no. 6008-0320) • 1 pc. 20 cm filling tube (DN 10 mm) (art.no. 6008-0326)	8012-2256
CBF / CBF-UL : Bag set incl. accessories (annual demand): • 12 empty tubular bags (art.no. 6002-0626. 6002-0626) • 4 two-piece tube connectors with 3-5mm nozzles (art.no. 6009-0322) • 4 two-piece tube connectors with 5-7mm nozzles (art.no. 6009-0323) • 12 gas fine filters (sterile filter) (art.no. 6014-0012) • 12 pc. 25 cm silicone tube (art.no. 6008-0320) • 4 pc. 20 cm filling tube (art.no. 6008-0326)	8009-1058
CBF / CBF-UL : BINDER water set incl. accessories (annual demand): • 10 one-liter bottles, prefilled with sterile, deionized water (art.no. 1007-0314) • 10 spike connectors (transfer sets) for sterile liquids (art.no. 6007-0131) • 3 two-piece tube connectors with 3-5mm nozzles (art.no. 6009-0322) • 3 pc. 25 cm silicone tube 3/5 mm (art.no. 6008-0320) • 3 pc. 10 cm silicone tube 3/5 mm (art.no. 6008-0326) • 3 gas fine filters (sterile filter) (art.no. 6014-0012)	8009-1104
CBF / CBF-UL : Water container set incl. accessories (annual demand): • Magnetic can holder adjustable in height, consisting of magnetic holder (art.no. 8022-0009) and water can support (art.no. 4021-0724) • Water can, 10 l (art.no. 6011-0192) • Hose coupling with aqua stop (art.no. 6002-0637) • Angular coupling plug with aqua stop (art.no. 6002-0638) • 1,2 m PTFE tape (Art. Nr. 1004-0011) for sealing the outlet tap • 12 gas fine filters (sterile filter) (art.no. 6014-0012) • 10 m silicone tube 3/5 mm (art.no. 6008-0311) to the pump or via T-type tube connectors to further chambers • 20 cm silicone tube 8/12 mm (art.no. 6008-0326) • Reducing connector (tube connector 4/9 mm) (art.no. 6009-0308) • 3 T-type tube connectors (T-Pieces), 4mm (art.no. 6009-0317)	8009-1128
CBF / CBF-UL : Pump head	5013-0204
CBF / CBF-UL : BINDER Pure Aqua Service	8012-0759
CBF / CBF-UL : Cartridge for BINDER Pure Aqua Service	6011-0165
CB: BINDER filling water for water pan (1 bottle with 1 l of sterile water)	1007-0327
CB: BINDER filling water for water pan (set of 6 bottles with 1 l of sterile water each)	8009-1192
Cleaning kit (neutral cleaning agent, disinfection spray and lint-free disposable wipes, protective gloves and goggles)	8012-0503
Neutral cleaning agent, 1 kg	1002-0016

Validation service	Art. no.
Qualification folder IQ-OQ (printed version)	7007-0001
Qualification folder IQ-OQ (digital version)	7057-0001
Qualification folder IQ-OQ-PQ (printed version)	7007-0005
Qualification folder IQ-OQ-PQ (digital version)	7057-0005
Execution of IQ-OQ	DL410200
Execution of IQ-OQ-PQ	DL440500

Calibration service	Art. no.
Calibration of temperature including certificate	8012-1132
Calibration of temperature and CO_2 including certificate	8012-1235
Calibration of O_2 including certificate (chamber with O_2 control)	8012-0229
Spatial temperature measurement including certificate (15-18 measuring points)	8012-1571
Spatial temperature measurement including certificate (9 measuring points)	8012-1550
Spatial temperature measurement including certificate (27 measuring points)	8012-1592
Spatial temperature and humidity measurement including certificate (27 measuring points for temperature, 1 measuring point for humidity)	8012-0924

For information on components not listed here, please contact BINDER Service.

24.7 Important conversion data for non-SI units

1 ft = 0.305 m

1 m = 100 cm = 3.28 ft = 39.37 inch

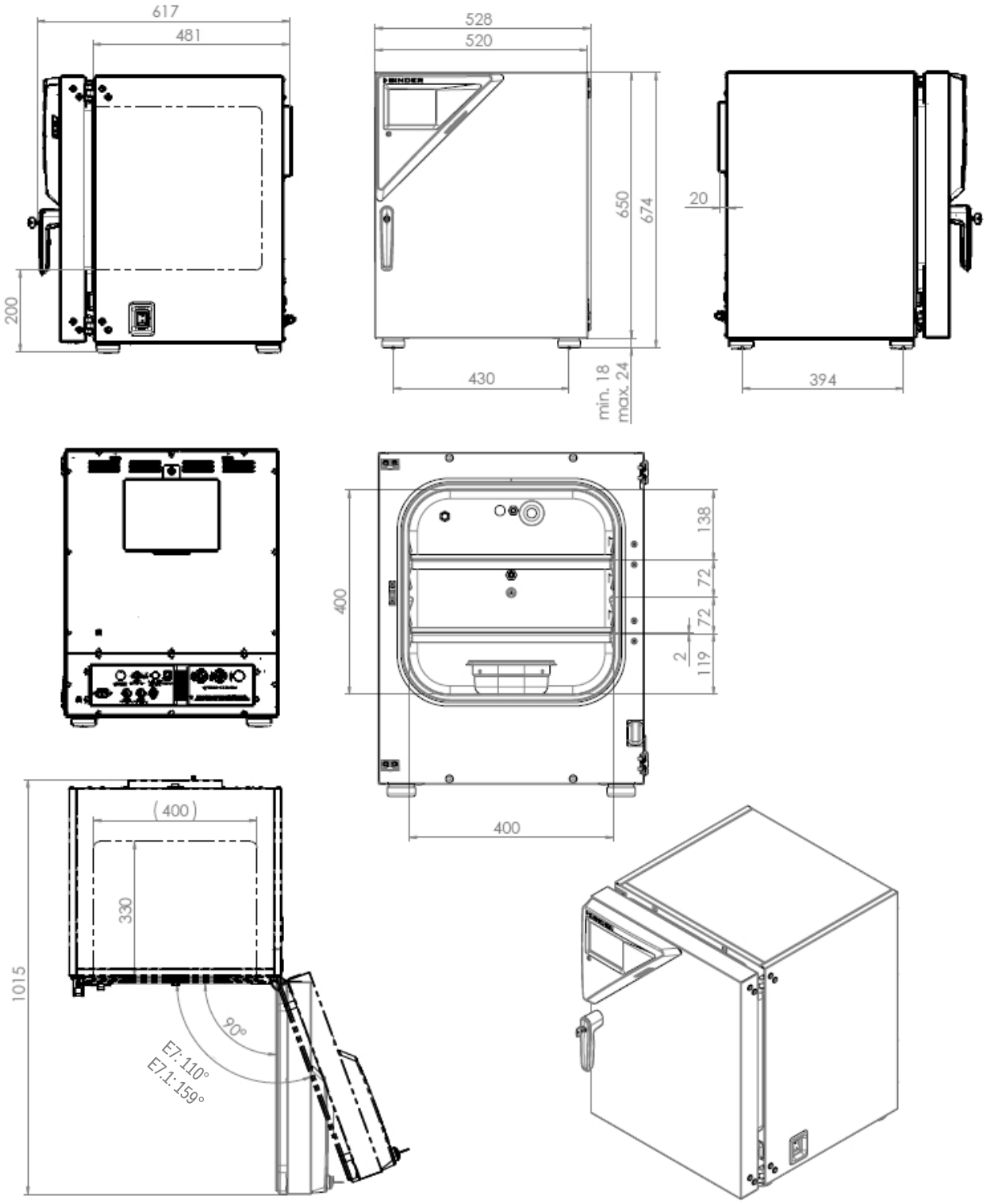
1 mbar = 0.0145 psi

24.8 Conversion table for gas inlet pressures, bar – psi

bar	psi	bar	psi	bar	psi
1	14.5	3	43.5	5	72.5
1.5	21.7	3.5	50.7	5.5	79.7
2	29.0	4	58.0	6	87.0
2.5	36.3	4.5	65.2		

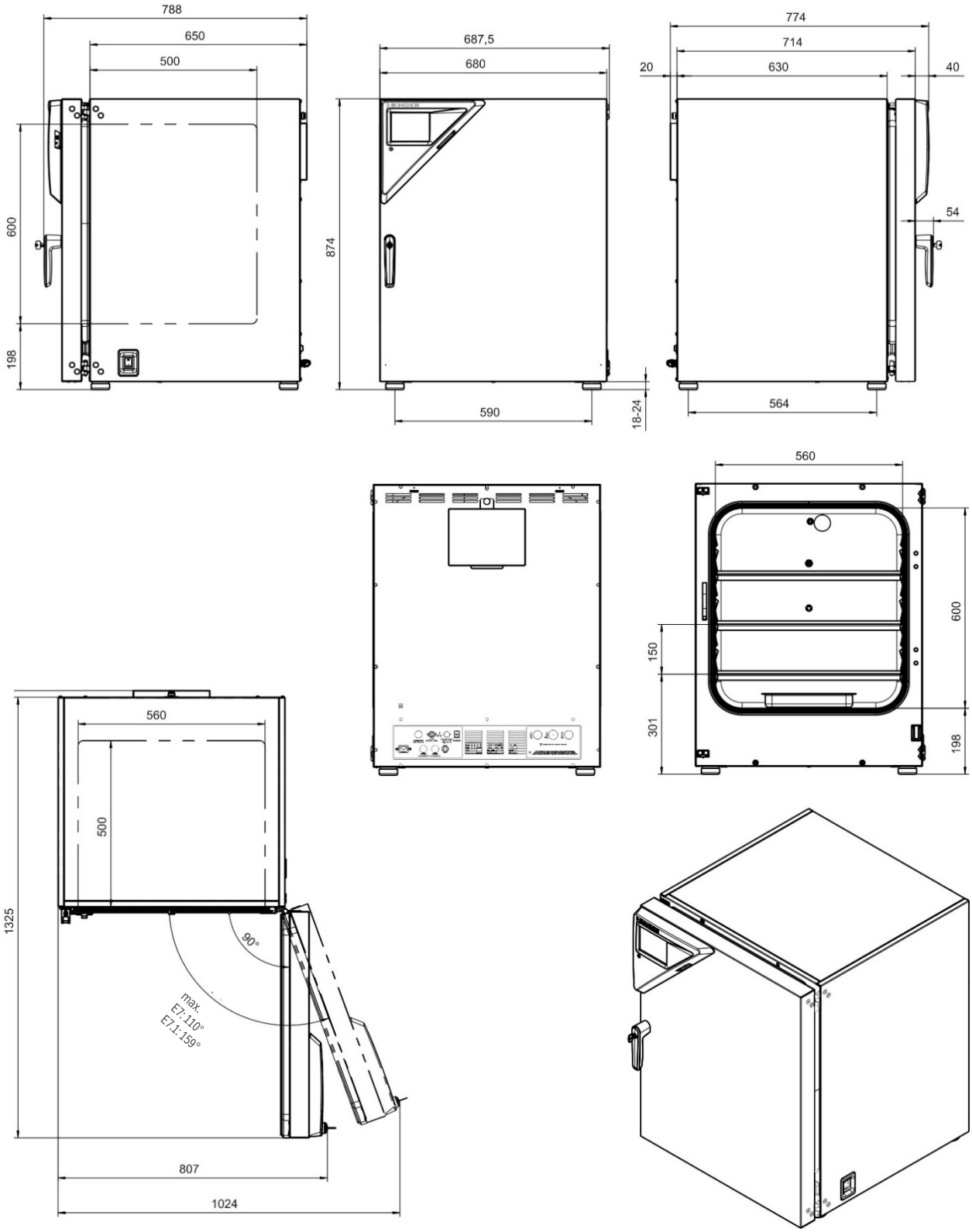
24.9 Dimensions

24.9.1 Chamber size 56



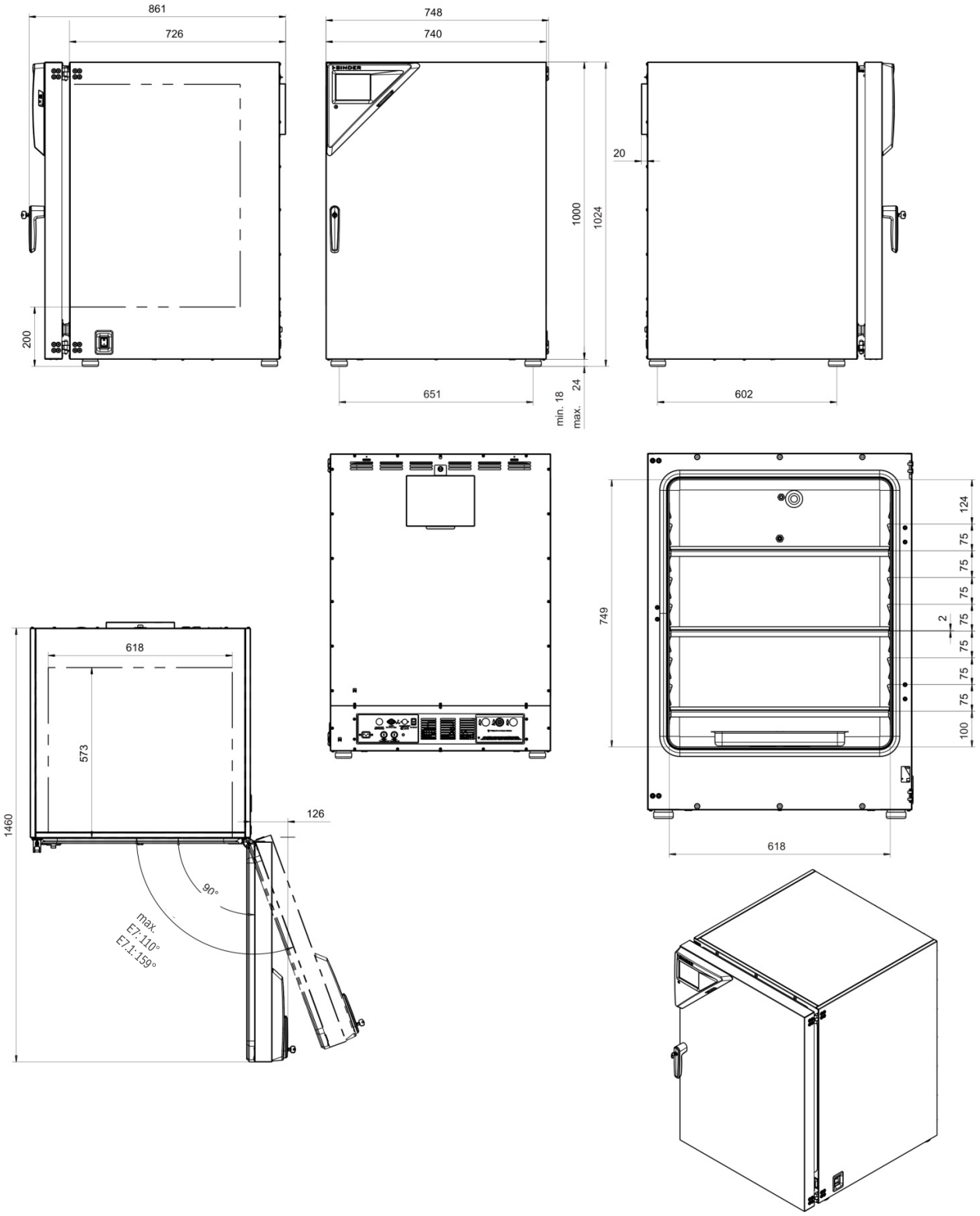
(Dimensions in mm)

24.9.2 Chamber size 170



(Dimensions in mm)

24.9.3 Chamber size 260



(Dimensions in mm)

25. Certificates and declarations of conformity

25.1 EU Declaration of conformity for CB

BINDER
Best conditions for your success

EU-Konformitätserklärung / EU Declaration of Conformity / Déclaration de conformité UE / Declaración de conformidad UE / Dichiarazione di conformità UE / Декларация соответствия EU

Hersteller / Manufacturer / Fabricant / Fabricante / Fabbricante / Производитель	BINDER GmbH
Anschrift / Address / Adresse / Dirección / Indirizzo / Адрес	Im Mittleren Ösch 5, 78532 Tuttlingen, Germany
Produkt / Product / Produit / Producto / Prodotto / Продукт	CO_2 -Inkubatoren CO_2 Incubators Incubateurs à CO_2 Incubadoras de CO_2 Incubatori a CO_2 CO_2 инкубаторы
Typenbezeichnung / Type / Type / Tipo / Tipo / Тип	CB 56, CB 170, CB 260 (E7, E7.1)
Art. No. / Art. no. / Réf. / Art. Nº / Art. n. / № арт.	9640-0005, 9640-0006, 9640-0007, 9640-0008, 9640-0009, 9640-0010, 9640-0011, 9640-0012, 9640-0013, 9640-0014, 9640-0015, 9640-0016, 9640-0027, 9640-0028

Die oben beschriebenen Maschinen sind konform mit folgenden EG/EU-Richtlinien (gemäß Veröffentlichung im Amtsblatt der europäischen Kommission):

The machines described above are in conformity with the following EC/EU Directives (as published in the Official Journal of the European Union):

Les machines décrites ci-dessus sont conformes aux directives CE/UE suivantes (selon leur publication dans le Journal officiel de l'Union européenne):

La máquina descrita arriba cumple con las siguientes directivas de la CE/UE (publicados en el Diario oficial de la Unión Europea):

Le macchine sopra descritte sono conforme alle seguenti direttive CE/UE (secondo la pubblicazione nella Gazzetta ufficiale della Commissione europea):

Машина,указанная выше, полностью соответствует следующим регламентам EC/EU (опубликованным в Официальном журнале Европейского Содружества):

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Geschäftsführung:
Dipl.-Ing. Peter M. Binder,
Michael Binder-Pfaff, Peter Wimmer,
Benjamin Jeuthe
Amtsgericht Stuttgart, HRB 727150
Sitz der Gesellschaft: Tuttlingen
Ust.-ID.-Nr.: DE815021304

Kreissparkasse Tuttlingen
IBAN: DE05 6435 0070 0000 0022 66
SWIFT: SOLA DE S1TUT
Deutsche Bank Tuttlingen
IBAN: DE56 6537 0075 0213 8709 00
SWIFT: DEUT DE SS653

BINDER
Best conditions for your success

- **2006/42/EC**
  Maschinenrichtlinie 2006/42/EG / Machinery directive 2006/42/EC / Directive Machines 2006/42/EC / Directiva 2006/42/CE (Máquinas) / Direttiva macchine 2006/42/CE / Директива о машинах 2006/42/EC
- **2014/30/EU**
  EMV-Richtlinie 2014/30/EU / EMC Directive 2014/30/EU / Directive CEM 2014/30/UE / Directiva CEM 2014/30/UE / Direttiva EMC 2014/30/UE / Директива ЭМС 2014/30/EU
- **2011/65/EU, (EU) 2015/863**
  RoHS-Richtlinien 2011/65/EU und (EU) 2015/863 / RoHS Directives 2011/65/EU and (EU) 2015/863 / Directives RoHS 2011/65/UE et (UE) 2015/863 / Directivas RoHS 2011/65/UE y (UE) 2015/863 / Direttive RoHS 2011/65/UE et (UE) 2015/863 / Директивы RoHS 2011/65/EU и (EU) 2015/863

Die oben beschriebenen Maschinen entsprechen aufgrund ihrer Konzipierung und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den einschlägigen grundlegenden Sicherheits- und Gesundheitsanforderungen der genannten EG/EU-Richtlinien.

The machines described above are conform to the mentioned EC/EU directives in regard to the relevant safety and health demands due to their conception and style of construction as well as to the version put onto market by us.

Les machines décrites ci-dessus correspondent aux demandes de sécurité et de santé des directives citées de la CE/UE due à leur conception et construction et dans la réalisation mise sur le marché par nous.

Las máquinas descritas arriba se corresponden con los requisitos básicos pertinentes de seguridad y salud de las citadas directivas de la CE/UE debido a su concepción y fabricación, así como a la realización llevada a cabo por nosotros.

Le macchine sopra descritte sono conforme ai requisiti essenziali di sanità e sicurezza pertinenti delle summenzionate direttive CE/UE in termini di progettazione, tipo di costruzione ed esecuzione messa da noi in circolazione.

Машины описано выше, соответствует указанным директивам EC/EU в отношении требований соответствующей безопасности и здоровья по концепции и конструкции так же как и версия, применяемая нами на рынке.

Die oben beschriebenen Maschinen tragen entsprechend die Kennzeichnung CE.

The machines described above, corresponding to this, bear the CE-mark.

Les machines décrits ci-dessus, en correspondance, portent l'indication CE.

Las maquinas descritas arriba, en conformidad, llevan la indicación CE.

Le macchine sopra descritte sono contrassegnate dal marchio CE.

Машины описано выше, в соответствии с изложенным выше маркированы знаком CE.

Die oben beschriebenen Maschinen sind konform mit folgenden harmonisierten Normen:

The machines described above are in conformity with the following harmonized standards:

Les machines décrits ci-dessus sont conformes aux normes harmonisées suivantes:

Las maquinas descritas arriba cumplen con las siguientes normas:

Le macchine sopra descritte sono conforme alle seguenti normative armonizzate:

Машины описано выше, полностью соответствуют следующим стандартам:

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Deutsche Bank Tuttlingen
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BINDER
Best conditions for your success

2006/42/EC
• **EN ISO 12100:2010** • **EN ISO 13732-1:2008** • **EN 60204-1:2018**
2014/30/EU
• **EN IEC 61326-1:2021**
2011/65/EU, (EU) 2015/863
• **EN IEC 63000:2018**

Zusätzlich angewandte Normen / Additionally applied standards / Normes supplémentaires appliquées / Normas aplicadas adicionalmente / Norme applicate in aggiunta / Дополнительно применяемые стандарты
• **EN 61010-1:**2010+A1:2019+A1:2019/AC:2019**;** • **EN IEC 61010-2-012:**2022 + A11:2022 • **UL 61010-1**:2012 Ed. 3+R: July2019; **CSA C22.2. No. 61010-1**: 2012 Ed. 3+R: Nov2018 • **UL 61010-2-010** Ed. 4 27Jun2019; **CSA C22.2 No. 61010-2-010**:2015 Ed. 3

78532 Tuttlingen, 15.07.2025

BINDER GmbH

P. Wimmer

Chief Technology Officer
Chief Technology Officer (CTO)
Directeur de la technologie
Director de la tecnología
Direttore tecnico
Главный технический директор

J. Bollaender

Leiter F & E und Dokumentationsbevollmächtigter
Director R & D and documentation representative
Chef de service R&D et autorisé de documentation
Responsable I & D y representante de documentación
Direttore R & D e responsabile della documentazione
Глава департамента R&D представитель документации

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Benjamin Jeuthe
Amtsgericht Stuttgart, HRB 727150
Sitz der Gesellschaft: Tuttlingen
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Deutsche Bank Tuttlingen
IBAN: DE56 6537 0075 0213 8709 00
SWIFT: DEUT DE SS653

25.2 EU Declaration of conformity for CBF

BINDER
Best conditions for your success

EU-Konformitätserklärung / EU Declaration of Conformity / Déclaration de conformité UE / Declaración de conformidad UE / Dichiarazione di conformità UE / Декларация соответствия EU

Hersteller / Manufacturer / Fabricant / Fabricante / Fabbricante / Производитель	BINDER GmbH
Anschrift / Address / Adresse / Dirección / Indirizzo / Адрес	Im Mittleren Ösch 5, 78532 Tuttlingen, Germany
Produkt / Product / Produit / Producto / Prodotto / Продукт	CO_2 -Inkubatoren CO_2 Incubators Incubateurs à CO_2 Incubadoras de CO_2 Incubatori a CO_2 CO_2 инкубаторы
Typenbezeichnung / Type / Type / Tipo / Tipo / Тип	CBF 170, CBF 260 (E7, E7.1)
Art. No. / Art. no. / Réf. / Art. Nº / Art. n. / № арт.	9640-0017, 9640-0018, 9640-0019, 9640-0020, 9640-0021, 9640-0022, 9640-0023, 9640-0024

Die oben beschriebenen Maschinen sind konform mit folgenden EG/EU-Richtlinien (gemäß Veröffentlichung im Amtsblatt der europäischen Kommission):

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Les machines décrites ci-dessus sont conformes aux directives CE/UE suivantes (selon leur publication dans le Journal officiel de l'Union européenne):

La máquina descrita arriba cumple con las siguientes directivas de la CE/UE (publicados en el Diario oficial de la Unión Europea):

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BINDER
Best conditions for your success

- **2006/42/EC**
  Maschinenrichtlinie 2006/42/EG / Machinery directive 2006/42/EC / Directive Machines 2006/42/EC / Directiva 2006/42/CE (Máquinas) / Direttiva macchine 2006/42/CE / Директива о машинах 2006/42/EC
- **2014/30/EU**
  EMV-Richtlinie 2014/30/EU / EMC Directive 2014/30/EU / Directive CEM 2014/30/UE / Directiva CEM 2014/30/UE / Direttiva EMC 2014/30/UE / Директива ЭМС 2014/30/EU
- **2011/65/EU, (EU) 2015/863**
  RoHS-Richtlinien 2011/65/EU und (EU) 2015/863 / RoHS Directives 2011/65/EU and (EU) 2015/863 / Directives RoHS 2011/65/UE et (UE) 2015/863 / Directivas RoHS 2011/65/UE y (UE) 2015/863 / Direttive RoHS 2011/65/UE et (UE) 2015/863 / Директивы RoHS 2011/65/EU и (EU) 2015/863

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Les machines décrites ci-dessus correspondent aux demandes de sécurité et de santé des directives citées de la CE/UE due à leur conception et construction et dans la réalisation mise sur le marché par nous.

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Машины описано выше, соответствует указанным директивам EC/EU в отношении требований соответствующей безопасности и здоровья по концепции и конструкции так же как и версия, применяемая нами на рынке.

Die oben beschriebenen Maschinen tragen entsprechend die Kennzeichnung CE.

The machines described above, corresponding to this, bear the CE-mark.

Les machines décrits ci-dessus, en correspondance, portent l'indication CE.

Las maquinas descritas arriba, en conformidad, llevan la indicación CE.

Le macchine sopra descritte sono contrassegnate dal marchio CE.

Машины описано выше, в соответствии с изложенным выше маркированы знаком CE.

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The machines described above are in conformity with the following harmonized standards:

Les machines décrits ci-dessus sont conformes aux normes harmonisées suivantes:

Las maquinas descritas arriba cumplen con las siguientes normas:

Le macchine sopra descritte sono conforme alle seguenti normative armonizzate:

Машины описано выше, полностью соответствуют следующим стандартам:

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Amtsgericht Stuttgart, HRB 727150
Sitz der Gesellschaft: Tuttlingen
Ust.-ID.-Nr.: DE815021304

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BINDER
Best conditions for your success

2006/42/EC
• **EN ISO 12100:2010** • **EN ISO 13732-1:2008** • **EN 60204-1:2018**
2014/30/EU
• **EN IEC 61326-1:2021**
2011/65/EU, (EU) 2015/863
• **EN IEC 63000:2018**

Zusätzlich angewandte Normen / Additionally applied standards / Normes supplémentaires appliquées / Normas aplicadas adicionalmente / Norme applicate in aggiunta / Дополнительно применяемые стандарты
• **EN 61010-1:**2010+A1:2019+A1:2019/AC:2019**;** • **EN IEC 61010-2-012:**2022 + A11:2022 • **UL 61010-1**:2012 Ed. 3+R: July2019; **CSA C22.2. No. 61010-1**: 2012 Ed. 3+R: Nov2018 • **UL 61010-2-010** Ed. 4 27Jun2019; **CSA C22.2 No. 61010-2-010**:2015 Ed. 3

78532 Tuttlingen, 15.07.2025

BINDER GmbH

P. Wimmer

Chief Technology Officer
Chief Technology Officer (CTO)
Directeur de la technologie
Director de la tecnología
Direttore tecnico
Главный технический директор

J. Bollaender

Leiter F & E und Dokumentationsbevollmächtigter
Director R & D and documentation representative
Chef de service R&D et autorisé de documentation
Responsable I & D y representante de documentación
Direttore R & D e responsabile della documentazione
Глава департамента R&D представитель документации

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25.3 UKCA Declaration of Conformity for CB

BINDER
Best conditions for your success

UKCA Declaration of Conformity	
Name and address of manufacturer	BINDER GmbH Im Mittleren Ösch 5, 78532 Tuttlingen, Germany
Name and address of UK Authorised Representative	Comply Express Ltd Unit C2, Coalport House, Stafford Park 1, Telford TF3 3BD
Object of the Declaration	CO_2 Incubators
Type Designation	CB 56, CB 170, CB 260 (E7, E7.1)
BINDER Art. No.	9640-0005, 9640-0006, 9640-0007, 9640-0008, 9640-0009, 9640-0010, 9640-0011, 9640-0012, 9640-0013, 9640-0014, 9640-0015, 9640-0016, 9640-0027, 9640-0028

The Objects of the Declaration described above are in conformity with the relevant UK Regulations and UK Guidelines:

- **Supply of Machinery (Safety) Regulations 2008**
  Statutory Instruments 2008 No. 1597 – Health and safety
- **Electromagnetic Compatibility Regulations 2016**
  Statutory Instruments 2016 No. 1091 – Electromagnetic Compatibility
- **The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012**
  Statutory Instruments 2012 No. 3032 – Environmental Protection

References of standards and/or technical specifications applied for this Declaration of Conformity, or parts thereof:

S.I. 2008 No. 1597	EN ISO 12100:2010 EN ISO 13732-1:2008 EN 60204-1:2018
S.I. 2016 No. 1091:	EN 61326-1:2021
S.I. 2012 No. 3032:	EN IEC 63000:2018
Additionally applied standards	
• EN 61010-1: 2010+A1:2019+A1:2019/AC:2019 • EN IEC 61010-2-012: 2022 + A11:2022	

This Declaration is issued under the sole responsibility of the manufacturer.

Tuttlingen	15.07.2025			
Place	Date	P. Wimmer Chief Technology Officer	J. Bollaender Director R & D	BINDER GmbH

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IBAN: DE56 6537 0075 0213 8709 00
SWIFT: DEUT DE SS653

25.4 UKCA Declaration of Conformity for CBF

BINDER
Best conditions for your success

UK CA

UKCA Declaration of Conformity

Name and address of manufacturer	BINDER GmbH Im Mittleren Ösch 5, 78532 Tuttlingen, Germany
Name and address of UK Authorised Representative	Comply Express Ltd Unit C2, Coalport House, Stafford Park 1, Telford TF3 3BD
Object of the Declaration	CO_2 Incubators
Type Designation	CBF 170, CBF 260 (E7)
BINDER Art. No.	9640-0017, 9640-0018, 9640-0021, 9640-0022

The Objects of the Declaration described above are in conformity with the relevant UK Regulations and UK Guidelines:

- **Electrical Equipment (Safety) Regulations 2016**
  Statutory Instruments 2016 No. 1101 – Consumer Protection Health and safety
- **Electromagnetic Compatibility Regulations 2016**
  Statutory Instruments 2016 No. 1091 – Electromagnetic Compatibility
- **The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012**
  Statutory Instruments 2012 No. 3032 – Environmental Protection

References of standards and/or technical specifications applied for this Declaration of Conformity, or parts thereof:

S.I. 2016 No. 1101:	EN 61010-1:2010 EN 61010-2-10 EN 60204-1:2018
S.I. 2016 No. 1091:	EN 61326-1:2013
S.I. 2012 No. 3032:	EN IEC 63000:2018

This Declaration is issued under the sole responsibility of the manufacturer.

Tuttlingen	01.06.2022			
Place	Date	P. Wimmer Vice President	J. Bollaender Director R & D	BINDER GmbH

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Amtsgericht Stuttgart, HRB 727150
Sitz der Gesellschaft: Tuttlingen
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Deutsche Bank Tuttlingen
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26. Contamination clearance certificate

26.1 For chambers located outside the USA and Canada

Declaration regarding safety and health

Erklärung zur Sicherheit and gesundheitlichen Unbedenklichkeit

The German Ordinance on Hazardous Substances (GefStofV), and the regulations regarding safety at the workplace, require that this form be filled out for all products that are returned to us, so that the safety and the health of our employees can be guaranteed.

Die Sicherheit und Gesundheit unserer Mitarbeiter, die Gefahrstoffverordnung GefStofV und die Vorschriften zur Sicherheit am Arbeitsplatz machen es erforderlich, dass dieses Formblatt für alle Produkte, die an uns zurückgeschickt wird.

	Note: A repair is not possible without a completely filled out form. Ohne Vorliegen des vollständig ausgefüllten Formblattes ist eine Reparatur nicht möglich.

- A completely filled out form must be transmitted via Fax (+49 (0) 7462 2005 93555) or by letter in advance, so that this information is available before the equipment/component part arrives. A second copy of this form must accompany the equipment/component part. In addition, the carrier should be informed.

  Eine vollständig ausgefüllte Kopie dieses Formblattes soll per Telefax (Nr. +49 (0) 7462 2005 93555) oder Brief vorab an uns gesandt werden, so dass die Information vorliegt, bevor das Gerät/Bauteil eintrifft. Eine weitere Kopie soll dem Gerät/Bauteil beigefügt sein. Ggf. ist auch die Spedition zu informieren.

- Incomplete information or non-conformity with this procedure will inevitably lead to substantial delays in processing. Please understand the reason for this measure, which lies outside our area of influence and will help us to speed up this procedure.

  Unvollständige Angaben oder Nichteinhalten dieses Ablaufs führen zwangsläufig zu beträchtlichen Verzögerungen in der Abwicklung. Bitte haben Sie Verständnis für Maßnahmen, die außerhalb unserer Einflussmöglichkeiten liegen und helfen Sie mit, den Ablauf beschleunigen.

- **Please print and fill out this form completely.**

  Bitte unbedingt vollständig ausfüllen!

1.	**Chamber/ component part / type:** / **Gerät / Bauteil / Typ:**
2.	**Serial No./ Serien-Nr.:**
3.	**Details about utilized substances / biological substances** / **Einzelheiten über die eingesetzten Substanzen/biologische Materialien:**
3.1	**Designations** / **Bezeichnungen:** a) _____ b) _____ c) _____
3.2	**Safety measures required for handling these substances** / **Vorsichtsmaßnahmen beim Umgang mit diesen Stoffen:** a) _____ b) _____ c) _____

3.3 Measures to be taken in case of skin contact or release into the atmosphere / Maßnahmen bei Personenkontakt oder Freisetzung:

a) _____

b) _____

c) _____

d) _____

3.4 Other important information that must be taken into account / Weitere zu beachtende und wichtige Informationen:

a) _____

b) _____

c) _____

4. Declaration on the risk of these substances (please checkmark the applicable items) / Erklärung zur Gefährlichkeit der Stoffe (bitte Zutreffendes ankreuzen) :

❑ **4.1 For non-toxic, non-radioactive, biologically harmless materials / für nicht giftige, nicht radioaktive, biologisch ungefährliche Stoffe:**

We hereby guarantee that the above-mentioned chamber / component part… / Wir versichern, dass o.g. Gerät/Bauteil...

❑ Has not been exposed to or contains any toxic or otherwise hazardous substances / weder giftige noch sonstige gefährliche Stoffe enthält oder solche anhaften.

❑ That eventually generated reaction products are non-toxic and also do not represent a hazard / auch evtl. entstandene Reaktionsprodukte weder giftig sind noch sonst eine Gefährdung darstellen.

❑ Eventual residues of hazardous substances have been removed / evtl. Rückstände von Gefahrstoffen entfernt wurden.

❑ **4.2 For toxic, radioactive, biologically harmful or hazardous substances, or any other hazardous materials / für giftige, radioaktive, biologisch bedenkliche bzw. gefährliche Stoffe oder anderweitig gefährliche Stoffe.**

We hereby guarantee that … / Wir versichern, dass …

❑ The hazardous substances, which have come into contact with the above-mentioned equipment/component part, have been completely listed under item 3.1 and that all information in this regard is complete / die gefährlichen Stoffe, die mit dem o.g. Gerät/Bauteil in Kontakt kamen, in 3.1 aufgelistet sind und alle Angaben vollständig sind.

❑ That the chamber /component part has not been in contact with radioactivity / das Gerät/Bauteil nicht mit Radioaktivität in Berührung kam

5. Kind of transport / transporter / Transportweg/Spediteur:

Transport by (means and name of transport company, etc.) Versendung durch (Name Spediteur o.ä.)

_____

Date of dispatch to BINDER GmbH / Tag der Absendung an BINDER GmbH:

_____

We hereby declare that the following measures have been taken / Wir erklären, dass folgende Maßnahmen getroffen wurden:

- ❑ Hazardous substances were removed from the chamber including component parts, so that no hazard exists for any person in the handling or repair of these items / das Gerät/Bauteil wurde von Gefahrstoffen befreit, so dass bei Handhabung/Reparaturen für die betreffenden Person keinerlei Gefährdung besteht
- ❑ The chamber was securely packaged and properly identified / das Gerät wurde sicher verpackt und vollständig gekennzeichnet.
- ❑ Information about the hazardousness of the shipment (if required) has been provided to the transporter / der Spediteur wurde (falls vorgeschrieben) über die Gefährlichkeit der Sendung informiert.

We hereby commit ourselves and guarantee that we will indemnify BINDER GmbH for all damages that are a consequence of incomplete or incorrect information provided by us, and that we will exempt BINDER GmbH from eventual damage claims by third parties./ Wir versichern, dass wir gegenüber BINDER für jeden Schaden, der durch unvollständige und unrichtige Angaben entsteht, haften und BINDER gegen eventuell entstehende Schadenansprüche Dritter freistellen.

We are aware that, in accordance with Article 823 of the German Civil Code (BGB), we are directly liable with regard to third parties, in this instance especially the employees of BINDER GmbH, who have been entrusted with the handling / repair of the chamber / component. / Es ist uns bekannt, dass wir gegenüber Dritten – hier insbesondere mit der Handhabung/Reparatur des Geräts/des Bauteils betraute Mitarbeiter der Firma BINDER - gemäß §823 BGB direkt haften

Name: _____

Position/Title: _____

Date / Datum: _____

Signature / Unterschrift: _____

Company stamp / Firmenstempel:

☞	Equipment that is returned to the factory for repair must be accompanied by a completely filled out contamination clearance certificate. For service and maintenance on site, such a contamination clearance certificate must be submitted to the service technician before the start of any work. No repair or maintenance of the equipment is possible, without a properly filled out contamination clearance certificate.

26.2 For chambers in the USA and Canada

Product Return Authorization Request

Please complete this form and the Customer Decontamination Declaration (next 2 pages) and attach the required pictures. E-mail to: IDL_SalesOrderProcessing_USA@binder-world.com

After we have received and reviewed the complete information we will decide on the issue of a RMA number. Please be aware that size specifications, voltage specifications as well as performance specifications are available on the internet at www.binder-world.us at any time.

Take notice of shipping laws and regulations.

	Please fill:	
Reason for return request	○ Duplicate order	
	○ Duplicate shipment	
	○ Demo	*Page one completed by sales*
	○ Power Plug / Voltage	115V / 230 V / 208 V / 240V
	○ Size does not fit space	
	○ Transport Damage	Shock watch tripped? *(pictures)*
	○ Other (specify below)	
	_____	
Is there a replacement PO?	○ Yes ○ No	
If yes -> PO #		
If yes -> Date PO placed		
Purchase order number		
BINDER model number		
BINDER serial number		
Date chamber was received		
Was the chamber unboxed?	○ Yes ○ No	
Was the chamber plugged in?	○ Yes ○ No	
Was the chamber in operation?	○ Yes ○ No	
Pictures of chamber attached? *Pictures of Packaging attached?*	○ Yes ○ No ○ Yes ○ No	Pictures have to be attached!

	Customer Contact Information	Distributor Contact Information
Name		
Company		
Address		
Phone		
E-mail		

Customer (End User) Decontamination Declaration

Health and Hazard Safety declaration

To protect the health of our employees and the safety at the workplace, we require that this form is completed by the user for all products and parts that are returned to us. (Distributors or Service Organizations cannot sign this form)

☞	NO RMA number will be issued without a completed form. Products or parts returned to our NY warehouse without a RMA number will be refused at the dock.

A second copy of the completed form must be attached to the outside of the shipping box.

1.	**Chamber/ component part / type**:
2.	**Serial No.**
3.	**List any exposure to hazardous liquids, gasses or substances and radioactive material**
3.1	**List with MSDS sheets attached where available or needed (if there is not enough space available below, please attach a page):** a) _____ b) _____ c) _____
3.2	**Safety measures required for handling the list under 3.1** a) _____ b) _____ c) _____
3.3	**Measures to be taken in case of skin contact or release into the atmosphere**: a) _____ b) _____ c) _____ d) _____
3.4	**Other important information that must be considered**: a) _____ b) _____ c) _____

4. Declaration of Decontamination
For toxic, radioactive, biologically and chemically harmful or hazardous substances, or any other hazardous materials. **We hereby guarantee that** 4.1 Any hazardous substances, which have come into contact with the above-mentioned equipment / component part, have been completely listed under item 3.1 and that all information in this regard is complete. 4.2 That the chamber /component part has not been in contact with radioactivity 4.3 Any Hazardous substances were removed from the chamber / component part, so that no hazard exists for a person in the shipping, handling or repair of these returned chamber 4.4 The chamber was securely packaged in the original undamaged packaging and properly identified on the outside of the packaging material with the chamber designation, the RMA number and a copy of this declaration. 4.5 Shipping laws and regulations have not been violated.
I hereby commit and guarantee that we will indemnify BINDER Inc. for all damages that are a consequence of incomplete or incorrect information provided by us, and that we will indemnify and hold harmless BINDER Inc. from eventual damage claims by third parties.
Name: _____ Position: _____ Company: _____ Address: _____ Phone #: _____ Email: _____ Date: _____ Signature: _____

☞	Equipment returned to the NY warehouse for repair must be accompanied by a completed customer decontamination declaration. For service and maintenance works on site, such a customer decontamination declaration must be submitted to the service technician before the start of work. No repair or maintenance of the equipment is possible without a completed form.