BINDER
Best conditions for your success

Operating Manual

Translation of the original operating manual

MKF (E3.2)

Alternating climate chambers with program control

Model	Model version	Art. No.
MKF 115	MKF115-400V	9020-0283, 9120-0283
	MKF115-400V-C	9020-0291 (with voltage and frequency changer)
MKF 240	MKF240-400V	9020-0285, 9120-0285
	MKF240-400V-C	9020-0295 (with voltage and frequency changer)
MKF 720	MKF720-400V	9020-0287, 9120-0287
	MKF720-400V-C	9020-0299 (with voltage and frequency changer)

MKFT (E3.2)

Alternating climate chambers with deep temperature with program control

Model	Model version	Art. No.
MKFT 115	MKFT115-400V	9020-0284, 9120-0284
	MKFT115-400V-C	9020-0293 (with voltage and frequency changer)
MKFT 240	MKFT240-400V	9020-0286, 9120-0286
	MKFT240-400V-C	9020-0297 (with voltage and frequency changer)
MKFT 720	MKFT720-400V	9020-0288, 9120-0288
	MKFT720-400V-C	9020-0301 (with voltage and frequency changer)

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Dear customer,

For the correct operation of the chamber, 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

This operating manual is part of the components of delivery. Always keep it handy for reference. The device 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. To avoid injuries and damage observe the safety instructions of the operating manual.

WARNING

Failure to observe the safety instructions.

Serious injuries and chamber damage.

- Observe the safety instructions in this operating manual.
- Carefully read the complete operating instructions of the chamber.

1.1 Legal considerations

This operating manual is for informational purposes only. It contains information for installing, start-up, operation 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. 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 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. The statements in this manual neither augment nor restrict the contractual warranty provisions.

1.2 Structure of the safety instructions

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

1.2.1 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

CAUTION

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.

1.2.2 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.

1.2.3 Pictograms

Warning signs			
 Electrical hazard	 Hot surface	 Explosive atmosphere	 Stability hazard
 Lifting hazard	 High humidity	 Scalding hazard	 Pollution hzard
 Harmful substances	 Biohazard	 Danger of frost	 Risk of corrosion and / or chemical burns
Mandatory action signs			
 Mandatory regulation	 Read operating instructions	 Disconnect the power plug	 Lift with mechanical assistance
 Environment protection	 Wear protective gloves	 Wear safety goggles	

Prohibition signs			
 Do NOT touch	 Do NOT spray with water	 Do NOT climb	

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

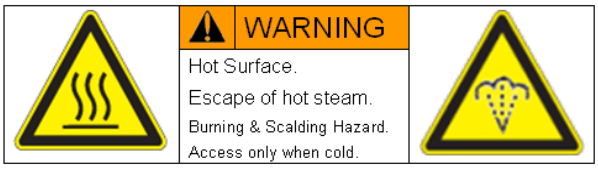
1.2.4 Word message panel structure

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.

1.3 Localization / position of safety labels on the chamber

The following labels are located on the chamber:

Pictograms (Warning signs)	
	Hot surface (on outer chamber door)
	Electrical hazard (chamber with voltage and frequency changer: on the voltage and frequency changer)
	Burning and scalding hazard (on chamber rear)
Service label	
	

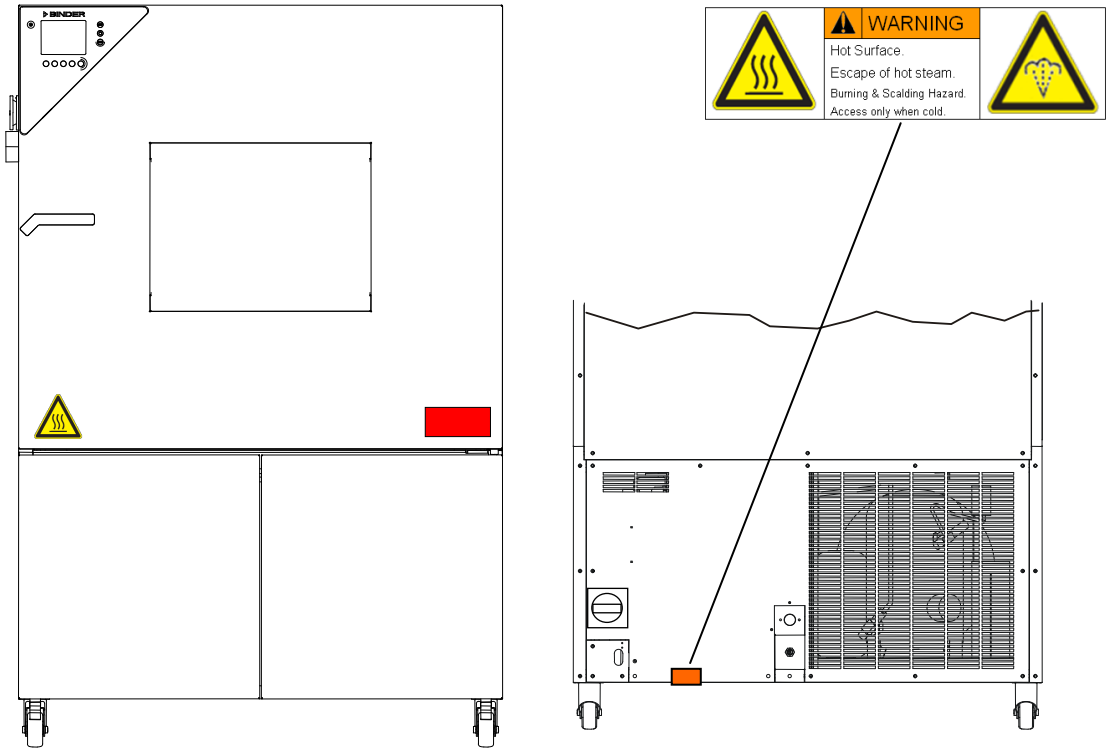


Figure 1: Position of labels on the chamber

	Keep safety labels complete and legible.

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

1.4 Type plate

The type plate sticks to the left side of the chamber, bottom right-hand, above the refrigerating and humidity module.

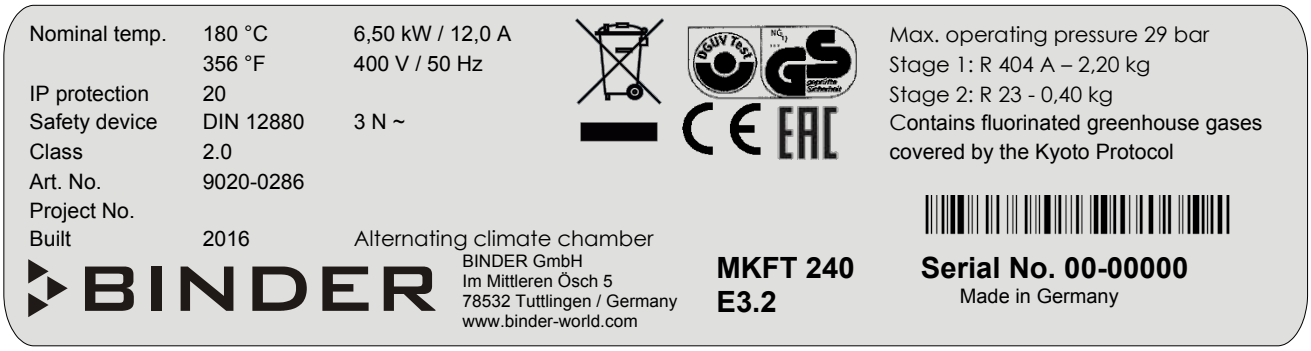


Figure 2: Type plate (example of MKFT 240 regular unit)

Indications of the type plate (example)		Information
BINDER		Manufacturer: BINDER GmbH
MKFT 240		Model designation
Alternating climate chamber		Device name
Serial No.	00-00000	Serial no. of the chamber
Built	2016	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	2.0	Class of temperature safety device
Art. No.	9020-0286	Art. no. of the chamber
Project No.	---	Optional: Special application acc. to project no.
6,50 kW		Nominal power
12,0 A		Nominal current
400 V / 50 Hz		Nominal voltage ± 10% at the indicated power frequency
3 N ~		Current type
Max operating pressure 29 bar		Max operating pressure in the refrigerating system
Stage 1: R 404A – 2,20 kg		Cooling 1st stage: Refrigerant type, filling weight
Stage 2: R 23 – 0,40 kg		Cooling 2nd stage: Refrigerant type, filling weight
Contains fluorinated greenhouse gases covered by the Kyoto Protocol		Contains fluorinated greenhouse gases covered by the Kyoto Protocol

Symbol on the type plate	Information
CE	CE conformity marking
	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 2002/96/EC on waste electrical and electronic equipment (WEEE).

Symbol on the type plate	Information
	GS mark of conformity of the “Deutsche Gesetzliche Unfallversicherung e.V. (DGUV), Prüf- und Zertifizierungsstelle Nahrungsmittel und Verpackung im DGUV Test“ (German Social Accident Insurance (DGUV), Testing and Certification Body for Foodstuffs and Packaging Industry in DGUV Test).
EAC	The equipment is certified according to Customs Union Technical Regulation (CU TR) for Russia, Belarus and Kazakhstan.

1.5 General safety instructions on installing and operating the chamber

With regard to operating the chamber and to the installation location, please observe the DGUV guidelines 213-850 on safe working in laboratories (formerly BGI/GUV-I 850-0, BGR/GUV-R 120 or ZH 1/119, issued by the employers’ liability insurance association) (for Germany).

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.

CAUTION

Danger of overheating.

Damage to the chamber.

∅ Do NOT install the chamber in unventilated recesses.

➢ Ensure sufficient ventilation for dispersal of the heat.

Do not operate the chamber in hazardous locations.

DANGER

Explosion hazard.

Danger of death.

∅ Do NOT operate the chamber in potentially explosive areas.

∅ KEEP explosive dust or air-solvent mixtures AWAY from the chamber.

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

DANGER

Explosion hazard.

Danger of death.

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

∅ NO explosive 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.

Familiarize yourself with any potential health risks caused by the charging material, a possibly contained moisture constituent or by reaction products that may arise during the conditioning process. Take adequate measures to exclude such risks prior to putting the chamber into operation.

DANGER

Electrical hazard.

Danger of death.

∅ The chamber must NOT become wet during operation or maintenance.

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

CAUTION

The window, the access ports and the inner chamber will become hot during operation.

Danger of burning.

∅ Do NOT touch the window, the access ports, the inner surfaces or the charging material during operation.

WARNING

Stability hazard.

Danger of injury.

Damage to the chamber and the charging material.

Housing cover breakaway.

∅ Do NOT climb on the lower housing cover.

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

1.6 Intended use

Alternating climate chambers series MKF / MKFT are suitable for temperature drying and heat treatment of solid or pulverized charging material, as well as bulk material, using the supply of heat. They are suitable for harmless materials. A mixture of any component of the charging material with air must NOT be explosive. 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.

Other applications are not approved.

The chambers are specially designed for solving all the problems which occur during material and ageing tests.

	Following the instructions in this operating manual and conducting regular maintenance work (chap. 17) is part of the intended use.

	**DANGER** **Explosion or implosion hazard.** **Danger of poisoning.** **Danger of death.** ∅ 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.

	**DANGER** **Explosion hazard.** **Danger of death.** ∅ Do NOT introduce any substance combustible or explosive at working temperature into the chamber. ∅ NO explosive dust or air-solvent mixture in the inner chamber.

	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.

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.

1.7 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.

1.8 Measures to prevent accidents

The operator of the chamber must observe the following rule: “Betreiben von Arbeitsmitteln. Betreiben von Kälteanlagen, Wärmepumpen und Kühleinrichtungen“ (Operation of work equipment. Operation of refrigeration systems, heat pumps and refrigeration equipment) (GUV-R 500 chap. 2.35) (for Germany).

The manufacturer took the following measures to prevent ignition and explosions:

- **Indications on the type plate**

  See operating manual chap. 1.4.

- **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 2 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. electric motors, power cables, solenoids). The machine has no permanent magnets. If persons with active implants (e.g. pacemakers, defibrillators) keep a safe distance (distance of field source to implant) of 30 cm, an influence of these implants can be excluded with high probability.

- **Protection against touchable surfaces**

  Tested according to EN ISO 13732-1:2008.

- Floors

  See operating manual chap. 3.4 for correct installation

- **Cleaning**

  See operating manual chap. 17.2.

- **Examinations**

  The chamber has been inspected by the “Deutsche Gesetzliche Unfallversicherung e.V. (DGUV) (German Social Accident Insurance (DGUV)” (German Social Accident Insurance (DGUV), Testing and Certification Body for Foodstuffs and Packaging Industry in DGUV Test) and bears the GS mark.

1.9 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	NO_x	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 only 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 the 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 alternating climate chamber MKF / MKFT is a specially developed precision cooling/warming cabinet for the domain of industrial material testing and environment simulation, with an unrivalled capacity, which far exceeds the capabilities of normal test cabinets, providing the ideal facilities for solving all the problems which occur during material as well as ageing and stress tests.

The chambers are equipped with a multifunctional microprocessor display controller with 2-channel technology for temperature and humidity plus a digital display accurate to one-tenth of a degree resp. 0.1% r.H. With its comprehensive program control functions, the display program controller MB1 permits the high precision performance of temperature and humidity cycles with rapid heating up and cooling down phases.

With its microprocessor controlled humidifying and dehumidifying system the chamber is a high-precision climatic test chamber. It covers the regular test specifications for temperature and climates corresponding to DIN und IEC standards. Furthermore, it permits simulating exactly and over long periods constant conditions for other applications such as sample conditioning for material testing of paper, textiles, plastics, building materials, etc.

The patented APT.line™ preheating chamber and air conduction technology guarantees excellent spatial temperature and humidity values for the total working area. The chamber provides a powerful refrigerating system with rapid cooling-down speeds. In addition, the chamber provides almost unlimited possibilities for adaptation to individual customer requirements based upon extensive programming options.

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

The high-quality housing insulation guarantees both a low noise mode of operation and a consistently low housing temperature. The inner chamber, the pre-heating chamber and the interior side of the doors are all made of stainless steel V2A (German material no. 1.4301, US equivalent AISI 304). When operating the chamber at temperatures above 150 °C / *302°F,* 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 housing is RAL 7035 powder-coated. All corners and edges are completely coated.

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 color-display controller MB1 and is also possible directly with a computer via Intranet in connection with the communication software APT-COM™ 3 DataControlSystem (option, chap. 16.1). The chamber comes equipped with an Ethernet serial interface for computer communication. In addition, the BINDER communication software APT-COM (option) permits networking up to 30 chambers and connecting them to a PC for controlling and programming, as well as recording and representing temperature and humidity data. For further options, see chap. 20.6.

The chambers are equipped with four castors. Both front castors can be easily locked via the attached brakes.

Temperature ranges:

- MKF without humidity: -40 °C / *104 °F* up to +180 ºC / *356 °F*,
- MKF in climatic operation: + 10 °C / *50 °F* up to +95 °C / *203 °F*
- MKFT without humidity: -70 °C / *-94 °F* up to +180 ºC / *356 °F*
- MKFT in climatic operation: + 10 °C / *50 °F* up to +95 °C / *203 °F*
- MKF / MKFT in climatic operation with optional compressed air dryer:
  0 °C / *32 °F* up to +95 °C / *203°F*

Humidity ranges:

- MKF / MKFT: 10% up to 98% r.H.
- MKF / MKFT with optional compressed air dryer: 5 % r.H. up to 98% r.H.

2.1 Chamber overview

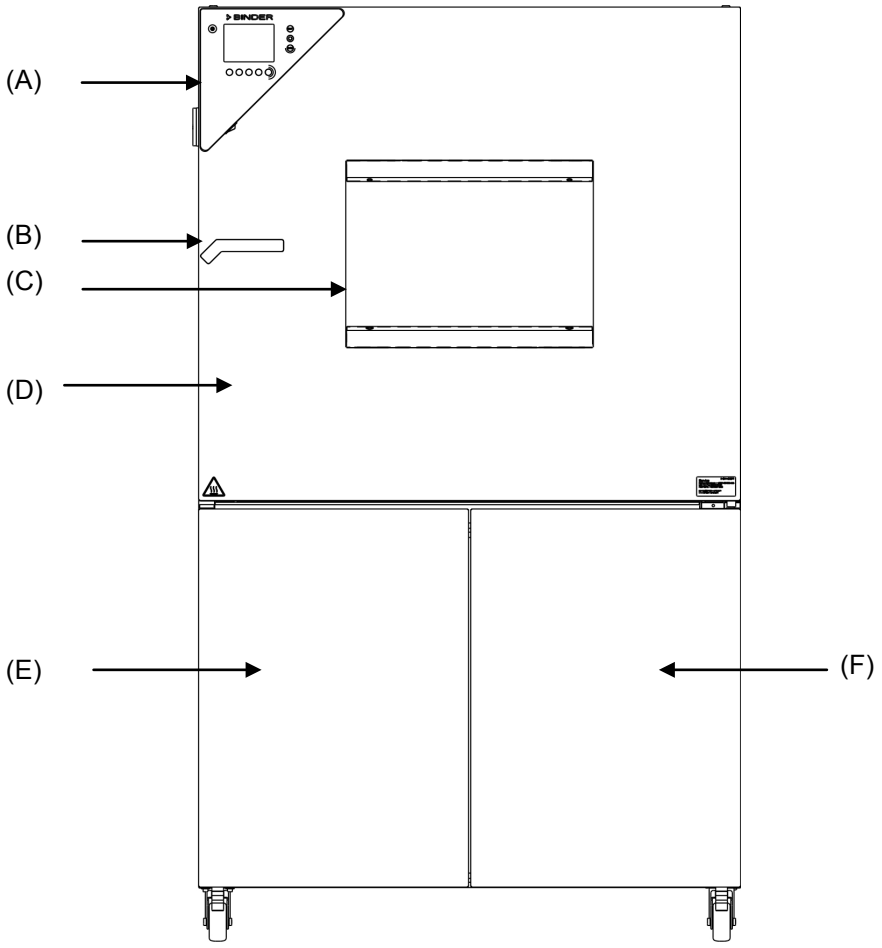


Figure 3: Alternating climate chamber MKF / MKFT

(A) Instrument panel
(B) Door handle
(C) Window
(D) Door
(E) Refrigeration machine
(F) Access to fill the water can and to the humidity generation module

2.2 Lateral control panel

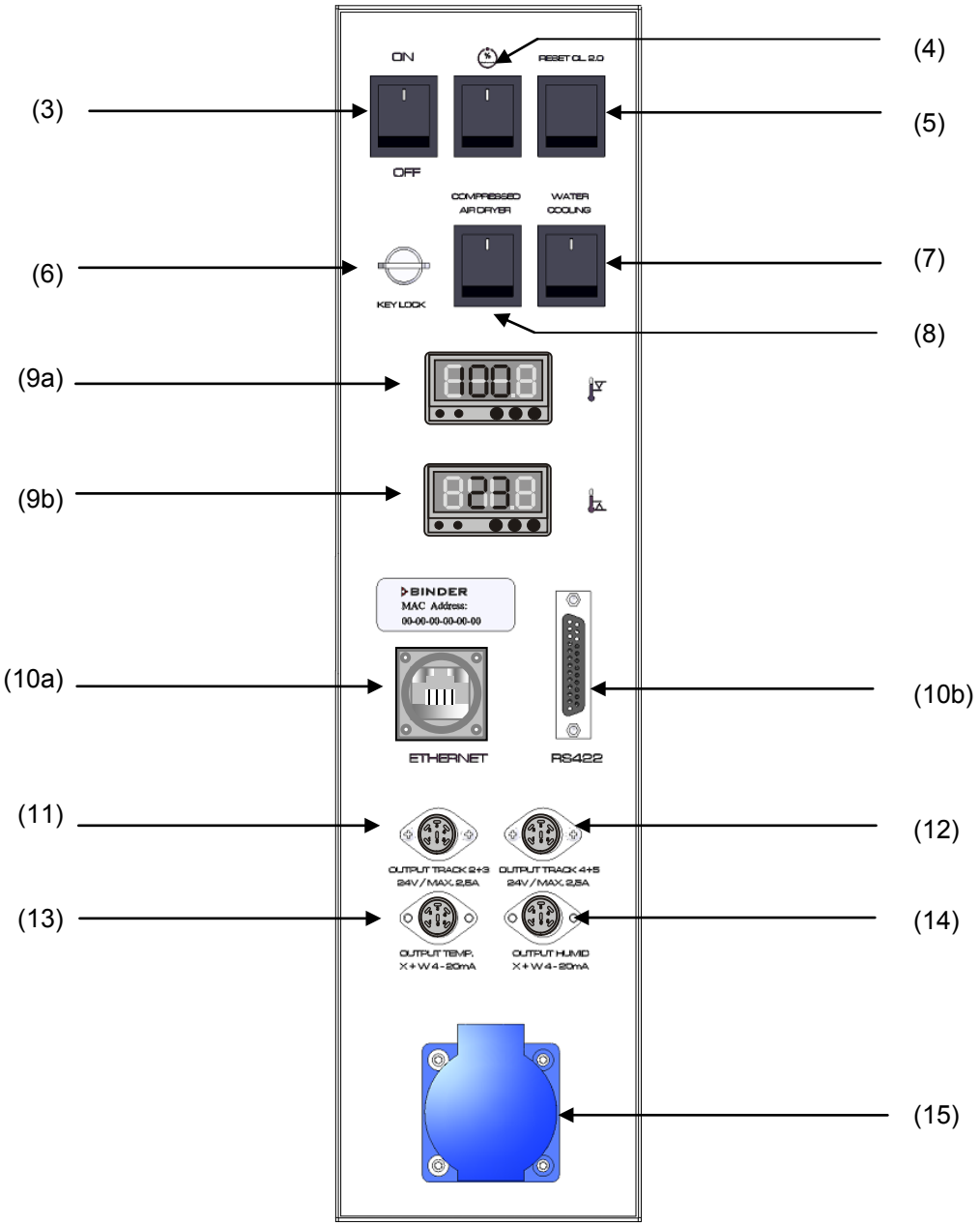


Figure 4: Lateral control panel MKF / MKFT at the right side of the humidity module with options

(3) Main power switch ON/OFF
(4) Humidity switch ON/OFF
(5) Reset switch for over and under temperature safety device class 2 (option)
(6) Key switch for keyboard locking (option)
(7) Switch for water cooling (only with MKF / MKFT 115 and 240) (option)
(8) Switch for compressed air dryer (option)
(9) Temperature safety device class 2 for over and under temperature (option):
Entry displays for upper (9a) and lower (9b) temperature limit
(10a) Ethernet interface for computer communication
(10b) RS422 interface for computer communication (option)
(11) 2 zero-voltage relay outputs via operation lines 2 and 3
(12) 2 zero-voltage relay outputs via operation lines 4 and 5
(13) Analog output temperature (option)
(14) Analog output humidity (option)
(15) Socket 230 V AC, max. 500 W

2.3 Instrument panel

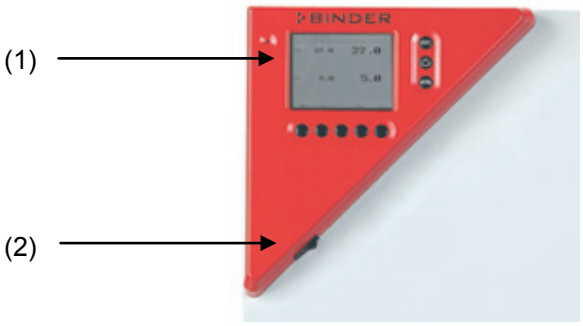


Figure 5: Triangle instrument panel

(1) Microprocessor program controller MB1 with 2-channel technology for temperature and humidity
(2) Switch for interior chamber light

2.4 Rear power switch

Figure 6: Rear view of the chamber

(3) Main power switch
(20) Rear power switch

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 take out the operating manuals and accessory equipment.

Remove the upholstered transport piece (L-type profile) from the lower door locking and keep it for possible later transportation.

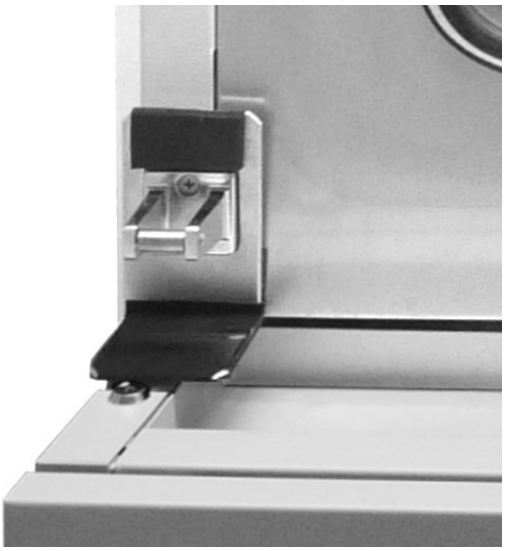


Figure 7:
Door locking with transport piece (state of delivery)

CAUTION

Sliding or tilting of the chamber**.**

Damage to the chamber**.**

Risk of injury by lifting heavy loads.

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

∅ Do NOT lift the chamber by hand.

➢ Keep the chamber in upright position.

➢ Lift the chamber from the pallet using technical devices (fork lifter). Set the fork lifter only from the rear in the middle of the chamber. Make sure to place all the lateral supports of the chamber on the forks.

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. 18.1.

Note on second-hand units (Ex-Demo-Units)

Second-hand units are chambers that have been 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 units 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

The front castors of the chamber can be blocked by brakes. Please move the chambers with castors only when empty and on an even surface, otherwise the castors may be damaged. Mount the upholstered steel L-type profile at the lower door locking. After operation please observe the guidelines for temporarily decommissioning the chamber (chap. 18.2).

CAUTION

Sliding or tilting of the chamber.

Damage to the chamber.

Risk of injury by lifting heavy loads.

- Do NOT lift or transport the chamber using the door handle, the door or at the lower housing.
- Do NOT lift the chamber by hand.
- Transport the chamber only in its original packaging.
- Secure the chamber with transport straps for transport.
- Keep the chamber in upright position.
- Place the chamber using technical devices (fork lifter) on the transport pallet. Set the fork lifter only from the rear in the middle of the chamber. Make sure to place all the lateral supports of the chamber on the forks.
- Transport the chamber with the original transport pallet. Set the fork lifter ONLY to the pallet. Without the pallet the chamber is in imminent danger of overturning.

You can order transport packing and pallets for transportation purposes from BINDER service.

Permissible ambient temperature range during transport:

- If the steam humidifying system has NOT been emptied: +3 °C / *37.4 °F* to +60 °C / *140 °F*.
- After BINDER Service has emptied the steam humidifying system: -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.

CAUTION

Transport below +3 °C / *37.4°F* with filled steam humidifying system.

Freezing in the steam generator.

Damage to the chamber.

- Contact BINDER Service before any transportation below +3 °C / *37.4°F*.

3.3 Storage

Intermediate storage of the chamber is possible in a closed and dry room. Observe the guidelines for temporary decommissioning (chap. 18.2).

Permissible ambient temperature range during storage:

- If the steam humidifying system has NOT been emptied: +3 °C / *37.4 °F* to +60 °C / *140 °F*.
- After BINDER Service has emptied the steam humidifying system: -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.

CAUTION

Storage below +3 °C / *37.4 °F* with filled steam humidifying system.

Freezing in the steam generator.

Damage to the chamber.

➢ Contact BINDER Service before any storage below +3 °C / *37.4 °F*.

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

CAUTION

Condensation by excess humidity.

Danger of corrosion on the housing after operating at humidity values > 70 % r.H. for a long period.

➢ Dry the appliance completely before shut-down:

- Set the humidity to 0 % r.H. or turn off humidity switch (4).
- Set the temperature set point to 150 °C / *302 °F* (Manual mode). Let the chamber operate for approx. 2-3 hours with closed door. Remove the access port plugs.
- Only then, shut down the chamber at the main power switch (3) and close the tap of the water supply.

After drying the chamber for decommissioning, the humidity value will approximate ambient humidity.

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 two hours until the chamber has attained ambient temperature and is completely dry and the oil in the compressors has warmed up.

In case of a prolonged temporal decommissioning: Leave the chamber door open or remove the access port plugs.

3.4 Location of installation and ambient conditions

Set up the chamber on a flat, even and non-flammable surface, free from vibration, and in a well-ventilated, dry location and align it using a spirit level. The site of installation must be capable of supporting the chamber's weight (see technical data, chap. 20.4). The chambers are designed for setting up inside a building (indoor use).

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 two hours until the chamber has attained ambient temperature and is completely dry and the oil in the compressors has warmed up.

CAUTION

Danger of overheating.

Damage to the chamber.

∅ Do NOT set up chambers in non-ventilated recesses.

➢ Ensure sufficient ventilation for dispersal of the heat.

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

	The ambient temperature should not be substantially higher than the indicated ambient temperature of +25 °C / *77°F* to which the specified technical data relate. For other ambient conditions, deviations from the indicated data are possible.

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

When operating the chamber at temperature set-points below ambient temperature, high ambient humidity may lead to condensation on the chamber.

- Installation height: max. 2000 m / *6.6 ft.* above sea level.

A water tap (1 bar to 10 bar) is necessary for the installation of the humidification system. If no suitable house water connection is available, you can manually supply water by filling the water can (chap. 4.2).

	To avoid any possible water damage, provide a floor drain at the location of the device. Select a suitable installation site to avoid any consequential damage by splashing water.

When placing several chambers of the same size side by side, maintain a minimum distance of 250 mm / *9.84 in* between each chamber. Wall distances: rear 300 mm / *11.81 in*, sides 200 mm / *7.87 in*. Spacing above the chamber of at least 200 mm / *7.87 in* must also be maintained.

- With optional compressed air dryer: Wall distance rear approx. 1 m / *3.28 ft* so that it is possible to read the status display of the compressed air dryer on the chamber rear.
- Chambers with voltage and frequency changer: rear wall distance of the alternating climate chamber approx. 1 m / *3.28 ft* to set up the voltage and frequency changer

	**CAUTION** **Danger by stacking.** **Damage to the chambers.** ∅ Do NOT place the alternating climate chambers on top of each other.

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

With an increased amount of dust in the ambient air, clean the condenser fan several times a year. We recommend checking the fan grid (behind the left maintenance access flap) every week. In case of visible dirt accumulation, disconnect the chamber and clean the fan grid by suction.

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

The chamber must not be installed and operated in potentially explosive areas.

	**DANGER** **Explosion hazard.** **Danger of death.** ∅ Do NOT operate the chamber in potentially explosive areas. ∅ KEEP explosive dust or air-solvent mixtures AWAY from the vicinity of the chamber.

4. Installation and connections

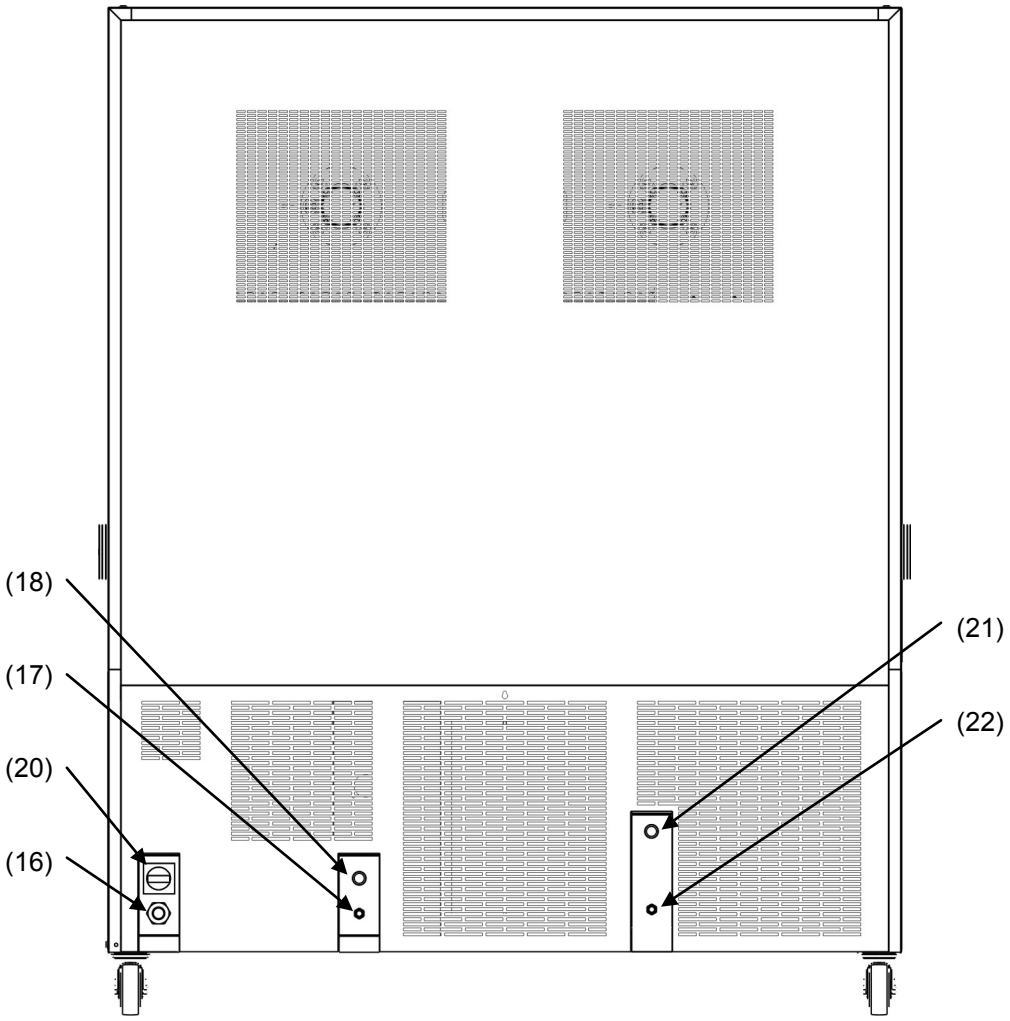


Figure 8: Rear view of the chamber with water connections and optional water cooling

(16) Power cable

(17) Wastewater connection “OUT” with hose olive for hose ½“

(18) Freshwater connection “IN” with screw thread ¾’’ for hose ½“, with union nut

(20) Rear power switch

(21) Connection “OUT” for cooling water outlet with screw thread ¾’’ for hose ½“, with union nut (option water cooling)

(22) Connection “IN” for cooling water inlet with screw thread ¾’’ for hose ½“, with union nut (option water cooling)

4.1 Wastewater connection for humidifying system

Fasten the wastewater hose to the wastewater connection “OUT” (17) (Figure 8) on the rear of the chamber (olive ∅ 14 mm). Observe the following points:

- You can use a part of the supplied tap water hose as a drainage hose. In case another hose is used, it has to be permanently resistant against at least 95 °C / *203 °F*.
- Mount the wastewater hose with a maximum positive inclination of 1 m and a maximum total length of 3 m.
- Protect both ends of the drainage hose with two of the four supplied hose clamps.

	Wastewater is collected in an internal can with a volume of approx. 0.5 liters. It is pumped off only when required, thus there is no continuous wastewater flow.

	Protect the wastewater supply at both sides with the supplied hose clamps.

4.2 Freshwater supply for humidifying system

	Connect the wastewater pipe **before** connecting the chamber to a freshwater pipe or filling the water can.

You can supply the chamber with freshwater via a water pipe or by manually filling the internal water can. It is not necessary to switch between both possibilities. When connecting to a water pipe, the water can is automatically filled.

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

	**CAUTION**
	Calcification of the humidifying system. **Damage to the chamber.** ➢ Operate the chamber with deionized (demineralized) water only.

Types of suitable water quality

- 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.)
- Water 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. 16.6).

	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.

4.2.1 Automatic fresh water supply for humidifying system via water pipe

An enclosure inside the chamber contains the connection kit for water supply and wastewater. Install the water supply connection using either the enclosed water hose or another pressure-resistant one. To accomplish this, remove the cover of the freshwater connection “IN” (18) (Figure 8) on the rear of the chamber. Protect both ends of the hose with two of the four supplied hose clamps. Before turning on the chamber, check the connection for leaks. Water supply is automatically effected via the freshwater connection “IN” (18).

	As the chamber only lets in water when required, there is no continuous water flow.

	• Supply pressure 1 to 10 bar when connecting to a water pipe. • Water type: deionized (demineralized) water • Water intake temperature NOT below +5 °C / *41 °F* and not exceeding 40 °C / *104 °F*. • The water intake shall be provided with a shut-off slide or water-tap. • For the water supply, fix the delivered adapter with hose olive on the thread at the rear of the chamber. • Protect the water supply at one side with the supplied hose clamp.

4.2.2 Manual fresh water supply for humidifying system via internal freshwater can

If no house water connection with suitable water is available, you can manually supply water by filling the freshwater can (total volume: 19 liters / *0.67 cu.ft.* up to the maximum level mark), which is located behind the right door of the humidity generation module.

The cover of the water inlet valve must be screwed on the freshwater connection “IN” (18). Open the door (F) (Figure 3) to access the filler neck of one of the water can. You cannot totally take out the water can because of its fix connections. Fill the water can only up to ¾, up to the maximum level mark. When filling it too much with the chamber turned on, the alarm message “WATER LEVEL TOO HIGH” is displayed on the controller (chap. 13.1). Manually suck off the water, or operate the chamber with high temperature and humidity values until the excess water is consumed. When filling it too much with the chamber turned off, water can escape from the chamber. Thus, ensure not to fill the can by more than the maximum level mark.

	To guarantee humidification during 24 hours even at high humidity set-points with manual water supply, we recommend filling the freshwater can (option) daily at the end of the day.

4.2.3 Water circle: lever for condensate recycling (option)

Figure 9: Lever for condensate recycling (open position)
next to the freshwater can behind the maintenance access door

The lever (19) for condensate recycling is located behind the maintenance access door next to the freshwater can.

- Open lever (vertical position): the condensate from the interior is conducted to the freshwater can. Use only with clean interior!
- Closed lever (horizontal position): the condensate is conducted to the wastewater connection. Use this position in case of soiling / contamination of the interior.

	CAUTION
	Soiling of the vapor humidification system. **Damage to the chamber.** ➢ Conduct the condensate to the wastewater connection in case of soiling / contamination of the interior (horizontal lever position).

4.3 Connection of cooling water outlet for water cooling (option)

An enclosure inside the chamber contains the connection kit for the cooling water inlet and outlet.

- Fasten the cooling hose to the connection “OUT” (21) (Figure 8) on the rear of the chamber (screw thread ¾’’).
- You can use a part of the supplied tap water hose as a drainage hose. In case another hose is used, it has to be permanently resistant against max. 50 °C / *122 °F*.
- Protect both ends of the drainage hose with two of the four supplied hose clamps. Before turning on the chamber, check the connection for leaks.

4.4 Connection of cooling water inlet for water cooling (option)

	Connect the cooling water outlet **before** connecting the cooling water inlet.

Type of suitable water quality:

- Water intake temperature: max. 10 °C / *50 °F*.
- pH value 4-7
- connection pressure: 4 to 10 bar

	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.

An enclosure inside the chamber contains the connection kit for the cooling water inlet and outlet.

- Fasten the cooling water hose to the connection “IN” (22) (Figure 8) on the rear of the chamber (screw thread ¾’’).
- Install the water supply connection using either the enclosed water hose or another pressure-resistant one. To accomplish this, remove the cover of the freshwater connection “IN” (22) (Figure 8) on the rear of the chamber.
- Protect both ends of the hose with two of the four supplied hose clamps. Before turning on the chamber, check the connection for leaks.

4.5 Connection kit for connecting the chamber's freshwater connection to a water pipe

A safety kit against flooding caused by burst water hoses is enclosed with the chamber. It consists of the following:

- Hose burst protection device
- Hose nozzle with screwing
- 4 hose clamps
- 6m water hose, divisible for the feed hose and drain

Protection principle of hose burst protection:

Whenever a strong water flow of approx. 18 l / min. occurs, e.g. caused by a burst water hose, a valve automatically cuts off the water supply, which can be heard as a clicking noise. The water supply now remains shut until it is manually released.

Assembly:

Screw the hose burst protection device onto a water tap with a G¾ inch right turning thread connection. The connection is self-sealing. Establish the connection between the safety kit and the chamber with a part of the supplied hose. Protect both ends of the hose by the supplied hose clamps.

We recommend connecting the hose as the last step in order to avoid twisting the hose while screwing on the safety kit.

Open the water tap slowly in order to avoid actuating the hose burst protection device.

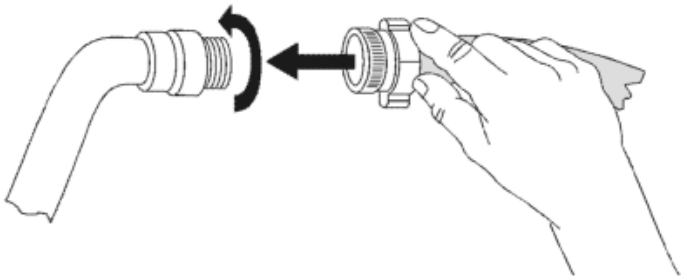


Figure 10: Assembly of the connection kit

Release of the reflux protection device:

In case the burst protection device has interrupted the water supply, first find the reason and remove it as necessary. Close the water tap. Release the valve by a half left-turn of the upper knurled part. You can hear the release of the valve as a clicking noise. Tighten the burst protection device against the water tap by a right turn. Open the water tap slowly afterwards.

Maintenance of the assembly of the hose burst protection device:

Calcification can impair valve function. We recommend an annual inspection by a skilled plumber. The plumber should remove the safety kit to check the valve by hand for proper function and calcification or blockage.

	CAUTION
	Danger of calcification. **Impairment of valve function.** ➢ Have a plumber inspect the valve annually. ➢ Remove calcifications by citric acid or acetic acid solutions. ➢ Continue by testing the function and tightness of the mounted unit.

Check: Quickly open the water tap while there is no chamber connected – the valve should cut off the water flux without any delay.

4.6 Safety kit: Hose burst protection device with reflux protection device for the chamber's freshwater connection (available via BINDER INDIVIDUAL customized solutions)

A safety kit with a reflux protection device is available for protection of the drinking water system, acc. to DIN 1988 part 4, and against flooding caused by burst water hoses.

Protection principles:

Whenever a strong water flow of approx. 18 l / min. occurs, e.g. caused by a burst water hose, a valve automatically cuts off the water supply, which can be heard as a clicking noise. The water supply now remains shut until it is manually released.

A possible endangering of the drinking water system depends on the risk potential of the charging material. Under unfavorable conditions (e.g. decreasing pressure inside the tap water system), drained off charging material could be sucked out of the chamber via the steam generator into the tap water system and therefore contaminate the drinking water. According to standard DIN 1988, part 4, the safety kit with a reflux protection device provides security in case of short-term utilization of substances with low risk potential. When using substances bearing a higher risk potential, install a pipe disconnector to assure absolute protection. It is the user's responsibility to prevent (according to national standards) any reflux of contaminated water from getting into the drinking water system.

Assembly:

The standard supplied parts – hose burst protection device, hose nozzle with screwing – are not needed.

Screw the pre-mounted assembly of the hose burst protection and reflux protection devices onto a water tap with a G¾ inch right turning thread connection. The connection is self-sealing. Establish the connection between the safety kit and the chamber with a part of the supplied hose. Protect both ends of the hose with the supplied hose clamps.

We recommend connecting the hose as the last step in order to avoid twisting it while screwing on the safety kit.

Open the water tap slowly in order to avoid actuating the hose burst protection device.

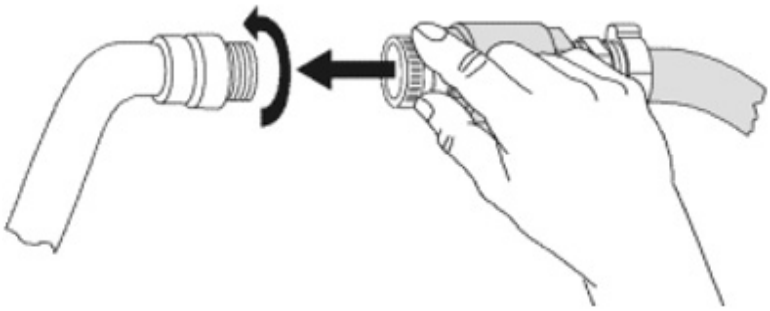


Figure 11: Assembly of the safety kit: hose burst protection and reflux protection devices (option)

Release of the reflux protection device:

In case the hose burst protection device interrupts the water supply, first find the reason and remove it as necessary. Close the water tap. Release the valve by a half left-turn of the upper knurled part. You can hear the release of the valve as a clicking noise. Tighten the burst protection device against the water tap by a right turn. Open the water tap slowly afterwards.

Maintenance of the assembly of hose burst protection and reflux protection devices:

Calcification can impair the function of both valves. We recommend an annual inspection by a skilled plumber. The plumber should remove the safety kit with the reflux protection device to check the two valves by hand for proper function and calcification or blockage.

CAUTION

Danger of calcification.

Impairment of valve function.

- ➢ Have a plumber inspect the two valves annually.
- ➢ Remove calcifications by citric acid or acetic acid solutions.
- ➢ Continue by testing the function and tightness of the mounted unit.

Check: Quickly open the water tap while there is no chamber connected – the valve should cut off the water flux without any delay.

4.7 Installation of the voltage and frequency changer (chambers with voltage and frequency changer)

The voltage and frequency changer is supplied packed separately together with the chamber.

CAUTION

Sliding or tilting of the voltage and frequency changer.

Damage to the voltage and frequency changer.

Risk of injury by lifting heavy loads.

- ∅ Do NOT lift the voltage and frequency changer by hand.
- ➢ Lift the voltage and frequency changer from the pallet using technical devices (fork lifter). Set the fork lifter only from the rear in the middle of the chamber.
- ➢ Alternatively, the voltage and frequency changer can also be lifted at the eyelets on the top by means of a lift truck

(a) Eyelets for lifting with a lift truck

(b) Positions for a forklift

Figure 12: Positioning of aids for lifting the voltage and frequency changer

For the installation of the voltage and frequency changer behind the chamber, provide a rear wall distance of the chamber of approx. 1 m / *3.3 ft*.

If possible, fix the voltage and frequency changer at the chamber. For this purpose, an Allen key size 4 is required. Connect the slots at the end of the chassis with two M6 screws to the threads provided below on the rear panel of the chamber (see Figure 13).

	CAUTION
	Danger of overheating. **Damage to the voltage and frequency changer.** ∅ Do NOT install the voltage and frequency changer in unventilated recesses. ➢ Ensure sufficient ventilation for dispersal of the heat.

The voltage and frequency changer is equipped with four castors. The rear castors can be easily locked via the attached brakes

4.8 Electrical connection

4.8.1 Information on connecting the alternating climate chamber

The chambers are supplied ready for connection. They come with a fixed power connection cable of 2700 mm / *8.9 ft* in length and are equipped with3 internal overload releases against excess-current.

Model	Power plug	Nominal voltage ± 10% at the indicated power frequency	Current type	Chamber fuse
MKF 115 MKFT 115 MKF 240	CEE plug 5-poles, 16 Amp	400 V at 50 Hz	3 N~	16 Amp 3 x internal
MKFT 240	CEE plug 5-poles, 16 Amp	400 V at 50 Hz	3 N~	16 Amp 3 x internal
MKF 720 MKFT 720	CEE plug 5-poles, 32 Amp	400 V at 50 Hz	3 N~	25 Amp 3 x internal

- The socket must also provide a protective conductor.
- 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, chap. 1.4)
- When connecting, please observe the regulations specified by the local electricity supply company and as well as the VDE directives (for Germany). 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

	CAUTION
	Danger of incorrect power supply voltage. **Damage to the equipment.** ➢ Check the power supply voltage before connection and start-up. ➢ Compare the power supply voltage with the data indicated on the type plate.

See also electrical data (chap. 20.4).

	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.

4.8.2 Connecting the voltage and frequency changer (for chambers equipped with a voltage and frequency changer)

The voltage and frequency changer is supplied with a fixed power connection cable without a plug. It is protected against excess-current with 3 internal overload releases. The connection is made by the customer.

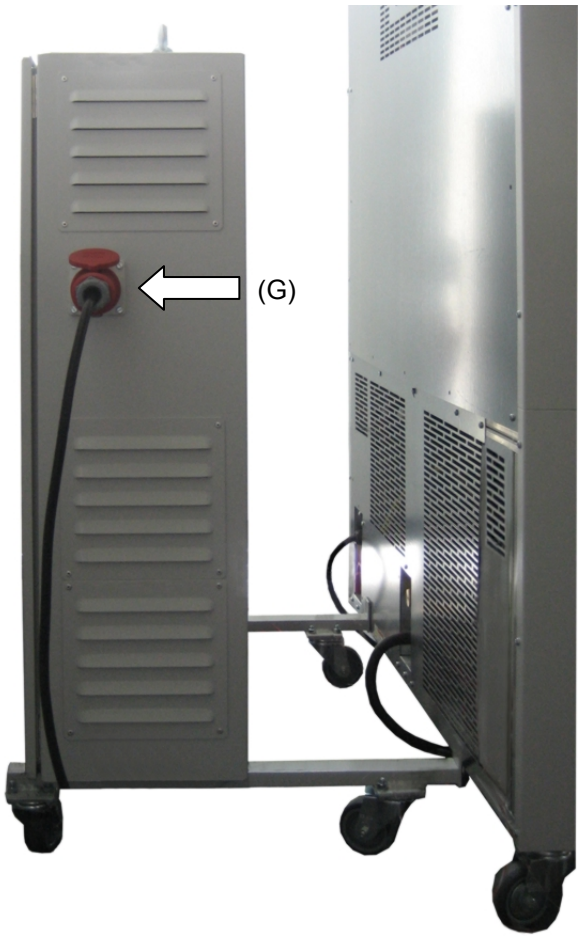
The socket must provide a protective conductor.

Electrical connection data:

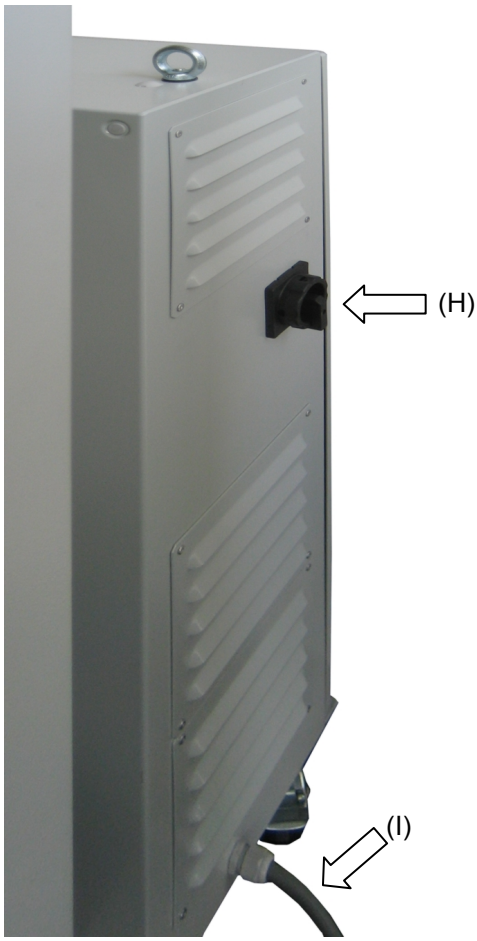
- Input side: 480 V, 60 Hz, 4-wire
- Output side (to the chamber): 400 V, 50 Hz, 5-wire

To establish the electrical connection of the alternating climate chamber with the voltage and frequency changer, proceed in the following order:

1. Connect the chamber to the connection socket (G) of the voltage and frequency changer
2. Establish the power connection of the voltage and frequency changer using the power cable (I)
3. Turn on the voltage and frequency changer at the power switch (H) (position “ON”)
4. Turn on the chamber with the main power switch (3) in the lateral control panel



Left side of the voltage and frequency changer with connection socket (G) for the alternating climate chamber



Right side of the voltage and frequency changer with power switch (H) and power cable (I)

Figure 13: Voltage and frequency changer, mounted

Figure 14: Power switch (H) of the voltage and frequency changer in position “ON”

In position “OFF” the switch can be locked, e.g. with a padlock.

5. Start up

After connecting the supply lines (chap. 4), you can start up the chamber.

- Turn on the rear power switch (20) at least one hour before operating the chamber.
- Turn on the chamber by the main power switch (3) in the lateral control panel.
- Open the water-tap for supply. Alternatively, fill the freshwater can (chap. 4).
- Turn on the humidifying and dehumidifying system with switch (4) (humidity switch ON/OFF).

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

The refrigerating and dehumidification functions are available only one hour after turning on the rear power switch (20). This is indicated by the notification “1H PREHEAT PHASE” in the controller display (chap. 13.1). After 1 minute the message “WATER TANK EMPTY” appears on the controller display. You can reset this message only after the 1-hour preheating phase.

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.

5.1 Function overview of display program controller MB1

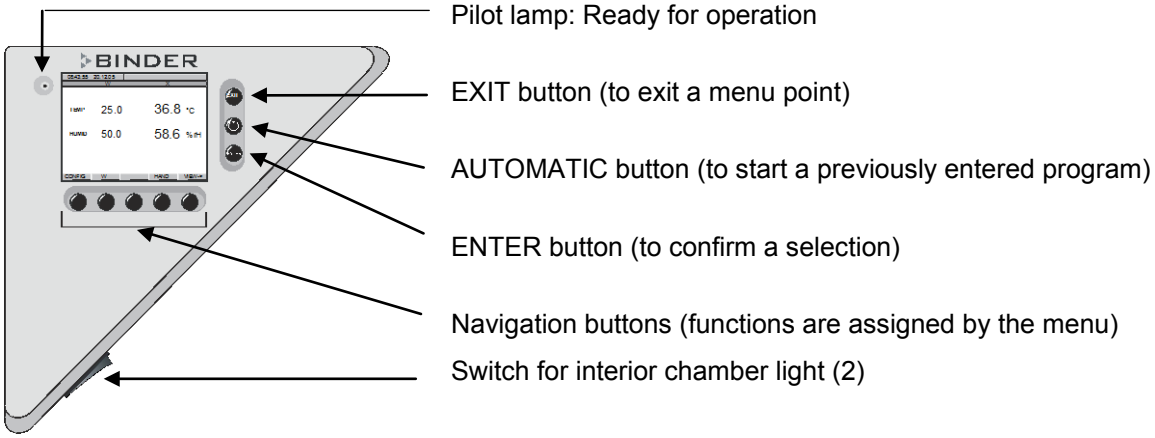


Figure 15: Temperature and humidity program controller MB1

The 2-channel program controller MB1 controls the following values inside the chamber:

- Channel 1: Temperature in °C. Range without humidity: -40 °C / *-40°F* up to 180 °C / *356°F*, in climatic operation: +10 °C / *50°F* up to +95 °C / *203°F*.
- Channel 2: Relative humidity in % r.H. Range 10 % r.H. to 98 % r.H.

You can enter the desired set point values in Manual Mode or Program Mode (chap. 5.2) on the display controller. For the control range of temperature and relative humidity, see chap. 14.

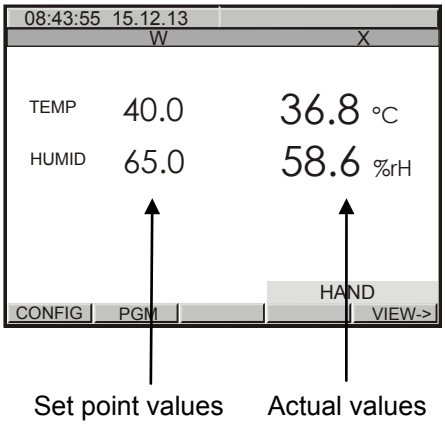


Figure 16: Normal display of the MB1 program controller in Manual mode

5.2 Operating modes

The 2-channel program controller MB1 operates in 3 modes:

Idle Mode	The controller is not functional, i.e., there is no heating or refrigeration and no humidification. The fan is off.
Manual Mode (Fixed value operation) (HAND)	The controller operates as a fixed-point control, i.e., set-points for temperature and humidity can be defined, which are then maintained (chap. 8).
Program Mode (AUTO)	An entered temperature and humidity program is run (chap. 9).

The 2-channel program controller MB1 permits programming temperature and humidity cycles.

The controller offers 25 program memory positions with 100 program sections each. The total number of program sections of all programs is limited to 500.

Programming can be done directly through the keypad of the controller or graphically through the software APT-COM™ 3 DataControlSystem (option, chap. 16.1) specially developed by BINDER.

5.3 Behavior after power failure

After power returns, the chamber continues to function in the original operating mode it was in previously before an actual power failure had occurred. In Manual Mode (HAND), the controller regulates temperature and humidity to the last entered set-points, while in Program Mode (AUTO) it regulates temperature and humidity to their set-points that were reached during the program operation. The power failure is noted in the event list (chap. 6.2) however, no error message is displayed indicating that a power failure has taken place.

5.4 Behavior when opening the door

When you open the door, temperature control (heating and refrigeration) immediately stops (the compressor continues running for 5 minutes without cooling). Humidification and dehumidification are off. The fan is off.

5.5 Turning on the chamber

Turn on the rear power switch (20) at least one hour before operating the chamber.

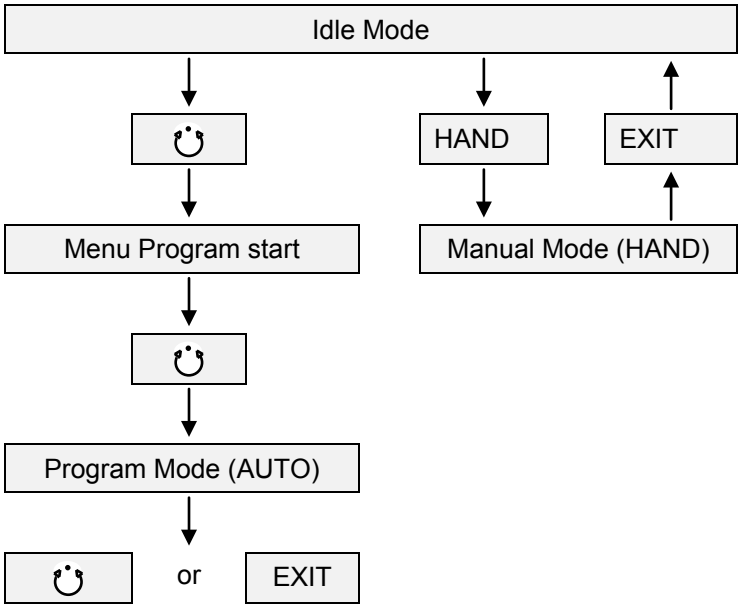
Set the main power switch (3) in position I. The pilot lamp shows the chamber is ready for operation.

	Observe a delay time of approx. 30s between turning Off and again On the main power switch (3). Otherwise an initialization problem might occur (display showing e.g. “–1999”).

The refrigerating and dehumidification functions are available only one hour after turning on the rear power switch (preheating phase). This is indicated by the notification “1H PREHEAT PHASE” on the controller display. After 1 minute the message “WATER TANK EMPTY” appears on the controller display. You can reset this message only after the 1-hour preheating phase.

Note that the chamber is in stand-by mode when the main power switch is in position I and the controller display is dark. Turn on the chamber by pressing any button. When turned on, the chamber functions in the operating mode entered before turning off. In Manual Mode (HAND), the controller regulates temperature and humidity to the last entered set-points, and in Program Mode (AUTO) it regulates temperature and humidity to their set-points reached during previous program operation.

Structure of toggling between Idle Mode / Manual Mode / Program Mode:



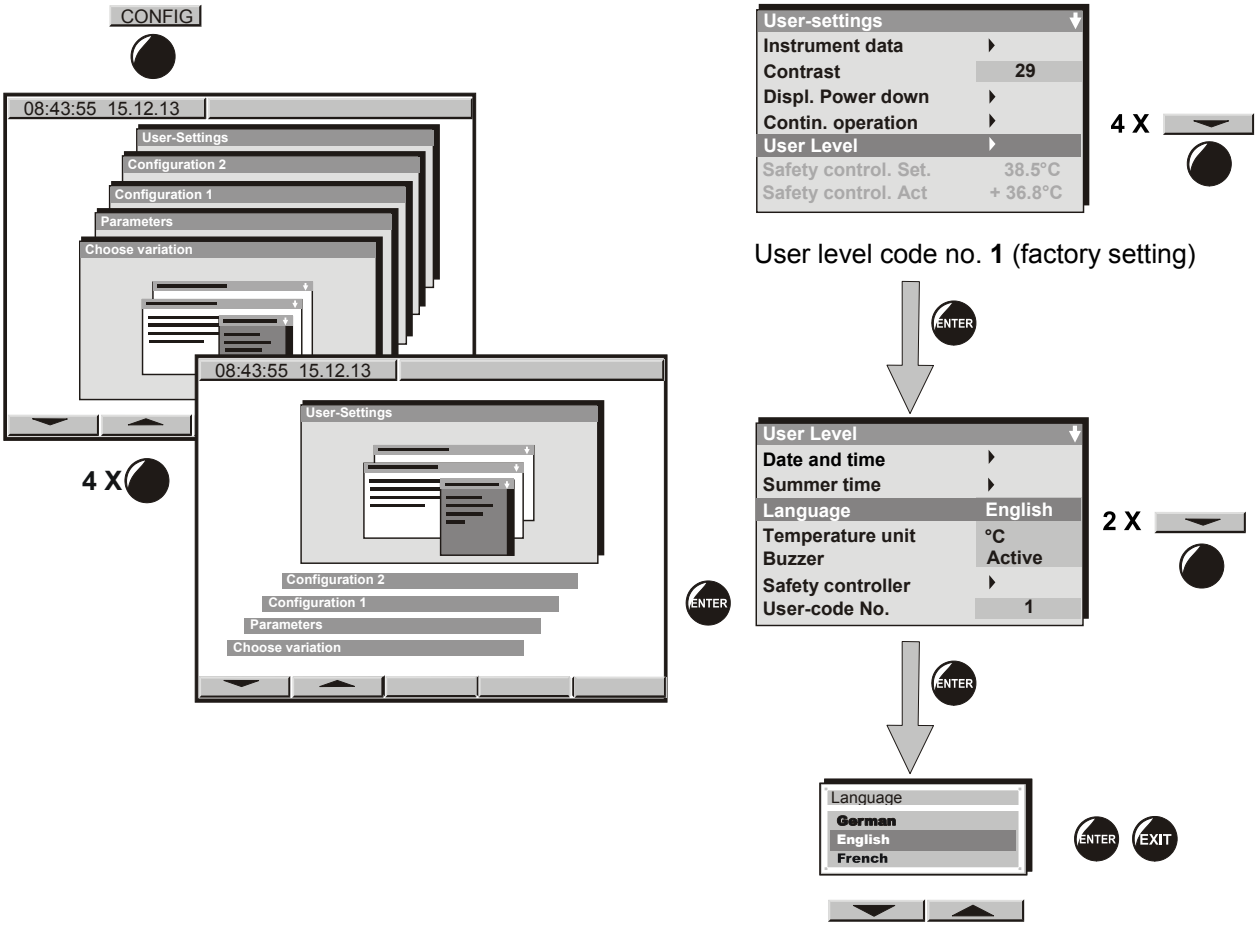
	For control reasons the refrigeration machine starts with a delay time. The refrigeration machine also turns off with a 5 minutes delay. This explains why the compressor may remain operating also during positive temperature jumps.

6. Controller MB1 settings

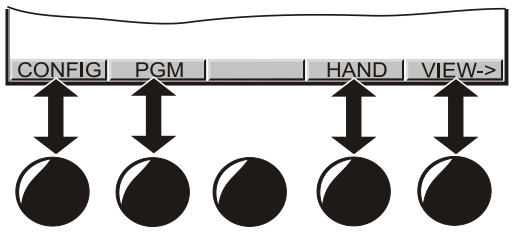
6.1 Selection of the menu language

The display program controller MB1 controls the temperature and humidity inside the chamber. The controller communicates by a menu guide using real words in German, English and French.

The selection of the desired menu language is located in the sub-menu “User-Level” of the “User-Settings” menu. Select menu point “Language“.



The row of buttons below the display is context-sensitive. The inscription above the buttons on the display defines the button’s function.



	Do NOT change the temperature unit from °C to °F.

6.2 Function overview program controller MB1

The main operation level contains the following different displays:

- **Normal display** (Idle Mode or Manual Mode or Program Mode)
- **Event List**
- **Chart recorder function**
- **Contact page**

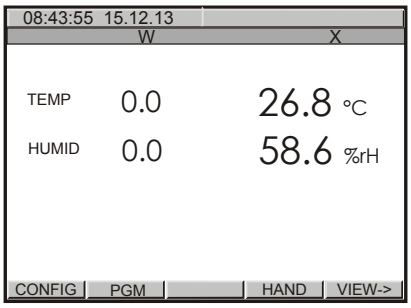
Toggle between the displays by pressing button VIEW ->.

The **NORMAL DISPLAY** enables comparison of the current temperature and humidity (W) to the set-point values (X).

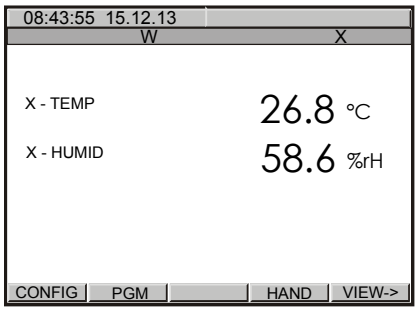
CONTACT PAGE

BINDER Service contact display.

NORMAL DISPLAY Idle Mode

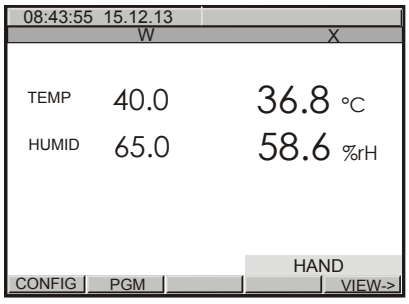


or



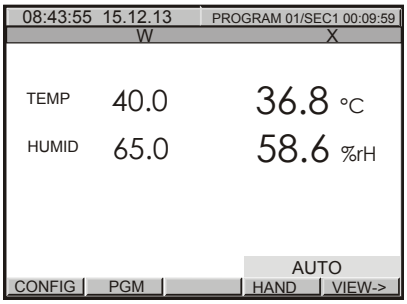
No heating or refrigeration, no humidification or dehumidification. The actual values (X) approximate ambient temperature and humidity. The fan is off.

NORMAL DISPLAY Manual Mode



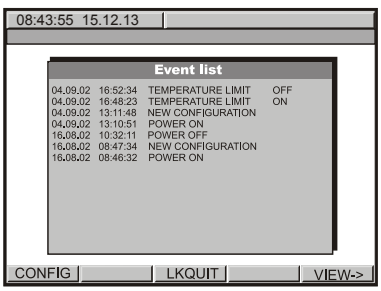
Temperature and humidity values are maintained according to the previous entered set-points (W).

NORMAL DISPLAY Program Mode



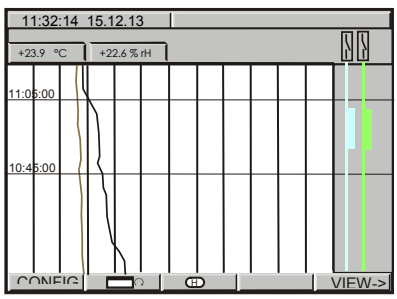
A temperature and humidity program entered before via a program table is run.

EVENT LIST



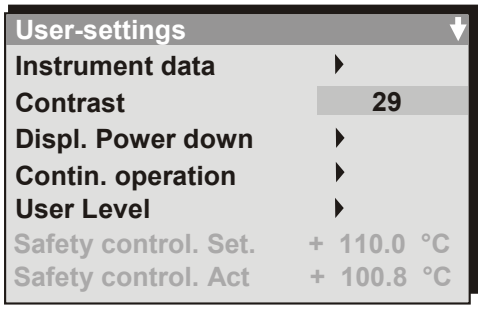
Overview over the last 16 events or error occurrences of the unit.

CHART RECORDER FUNCTION



Graphical display of the current temperature and humidity values and review of the previous measurements on a historical display. A memory interval of 5s corresponds to a supervision period of 2.5 days.

6.3 Menu settings in the “User-settings” menu



Instrument data

- **Instrument Name**

  Enter an individual name of the chamber.

- **Address**

  Enter a controller address (1 to 30) for operation with the communication software APT-COM™.

All other entries are relevant only for service purposes.

Contrast:

No function.

Displ. power down

- **Switch off event**

  Do not change the entry “Wait. Period”.

- **Waiting period**

  You can enter a delay time after which the display, following manual activation, will automatically be turned off again, on condition that the moment is outside the operation time defined in menu ”Contin. operation”.

Contin. operation

Enter an operation time to determine the period of display activity. Outside the defined period, the display is automatically turned off. Pressing down any key will reactivate the display. After the time set in menu “Displ. power down“, the display will turn off again as far as the actual time is not within the operation time fixed in menu “Cont. operation“.

User Level

Toggle here to the display menu “User Level” (chap. 6.4) by entering a password. Factory default setting for this password is +00001. You can change the password (“user code”) in the “User Level” menu.

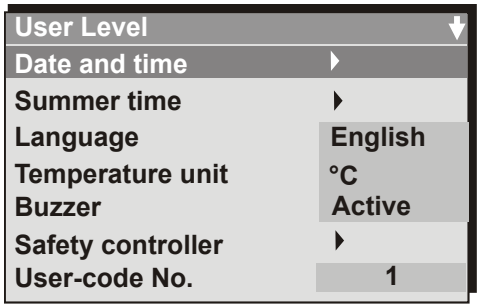
Safety control.Set

The setting of the tolerance limit of the safety controller (chap. 12.2) is displayed. You cannot change it in this view.

Safety control.Act

The measuring result of the safety controller is displayed. The safety controller compares the value measured by a second independent temperature sensor to the entered tolerance limit.

6.4 Menu settings in the “User Level” menu



Date and time

Enter the actual date and time to provide the proper measurement records. Data is displayed in the chart recorder function (chap. 7) of the controller and will remain stored in case of a power failure.

Summer time

Time is set one hour in advance during the summer time period.

Setting the summer time switch:

- **Off:** No change to summer time occurs
- **User timed:** Beginning and end of summer time can be set individually
- **Automatic:** The summer time arrangement for central Europe is enabled (summer time from last Sunday of March until last Sunday of October)

Language

Select the menu language as German, English, or French (chap. 6.1).

Temperature unit

	Do NOT change the temperature unit from °C to °F.

Buzzer

Audible alarm buzzer

- **Inactive:** No audible alarm will sound if an alarm event happens (chap. 13).
- **Active:** An audible alarm will sound in case of an alarm event (chap. 13).

Safety controller

Enter a safety controller tolerance limit to prevent temperature from exceeding this setting. For setting, see chap. 12.2.

User-Code No.

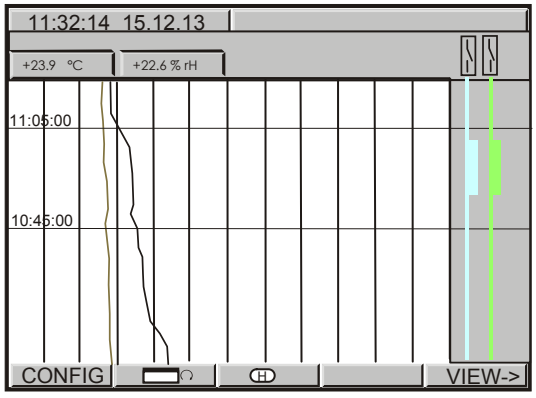
Change the password (“user code”) needed to access the menu “User settings”. Factory default setting +00001.

	Make a note of any change in the user password. There is no access to this menu without the correct password.

7. Graphic representation of the historical measurement (chart recorder function)

The representation of data imitates a chart recorder and allows recalling any set of measured data of any point of time taken from the recorded period.

Normal display of the chart recorder function:



Top left: The actual date and time are displayed.

Below: The current values of temperature [°C] and humidity [% r.H.] are numerically and graphically displayed.

Scaling:

MKF: Temperature: -50 °C / *-58°F* to +200 °C / *392°F*

MKFT: Temperature: -100 °C / *-148°F* to +200 °C / *392°F*.

Humidity: 0% r.H. to 100% r.H.

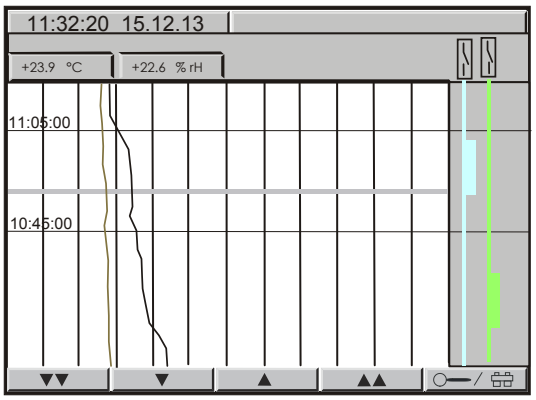
Button [▭○] permits toggling between different representations.

Depending on the selected kind of representation, button [⊕] might not have been visible until this procedure.

Activation of the optional over- or under temperature safety device (chap. 12.3) is displayed on the right side of the display as an enlarged blue line.

The active bedew protection is displayed on the right side of the display as an enlarged green line.

History display with cursor:



Select button [⊕] = History. A pink line appears on the display marking as a cursor the selected moment. You can now recall the recorded data of any defined moment.

Top left: Date and time of the selected cursor position are displayed.

Below: The corresponding temperature and humidity values of this instance are numerically and graphically displayed.

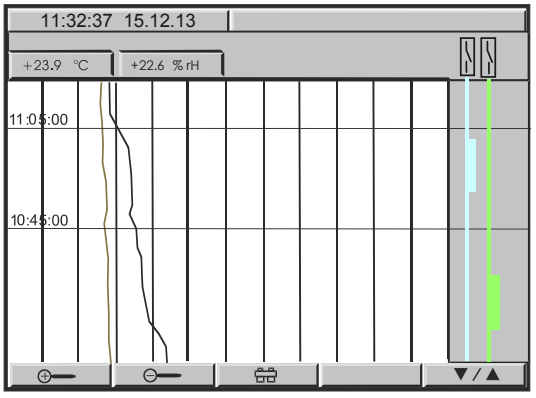
Scroll the cursor position using the arrow buttons.

Single arrow buttons: fine-tuning.

Double arrow buttons: page-up and page-down.

Switch to the zoom display by pressing button [○—/ 🖴] :

History - zoom function:

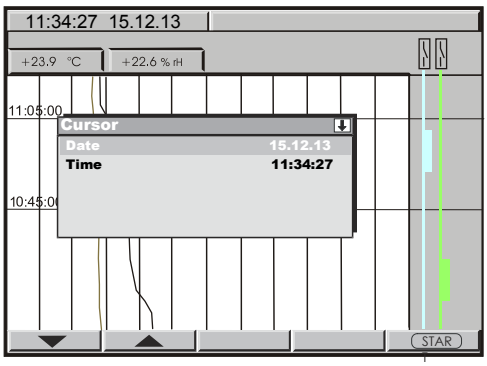


Magnifier buttons [⊕—] [⊖—] : Zoom and zoom back (i.e., shorten or extend the displayed period).

Toggle back to the former representation display using this button [▼/▲].

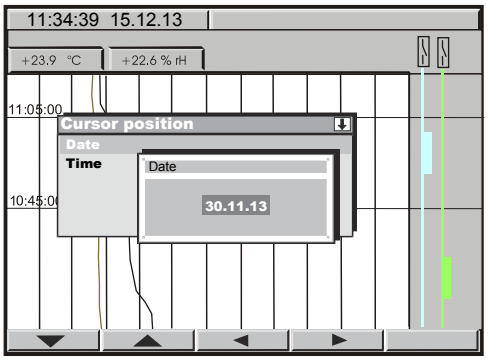
You can also directly enter any cursor position as a numerical input.

History representation: Toggling to any defined moment:



Press button [ ]. The window “Cursor position” opens to enter date and time.

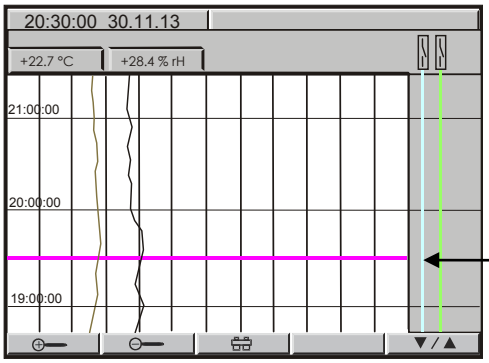
Select date or time with the arrow buttons and confirm with ENTER.



Now you can access any moment that you would like to recall. Enter date and time with the arrow buttons and confirm with ENTER.

Press button [START] .

History display at the selected point of time:



Top left: Date and time of the selected cursor position are displayed.

Below: The corresponding temperature and humidity values of this moment are numerically and graphically displayed.

The cursor line marks the corresponding moment.

The available presentation depends on the pre-selected storage rate. This means the higher the storage rate, the more precisely but shorter the data representation will be, see table below:

Storage rate	Storage duration	
	(hours)	(days)
5 sec	60	2.5
10 sec	120	5
1 min	720	30
5 min	3600	150
10 min	7200	300

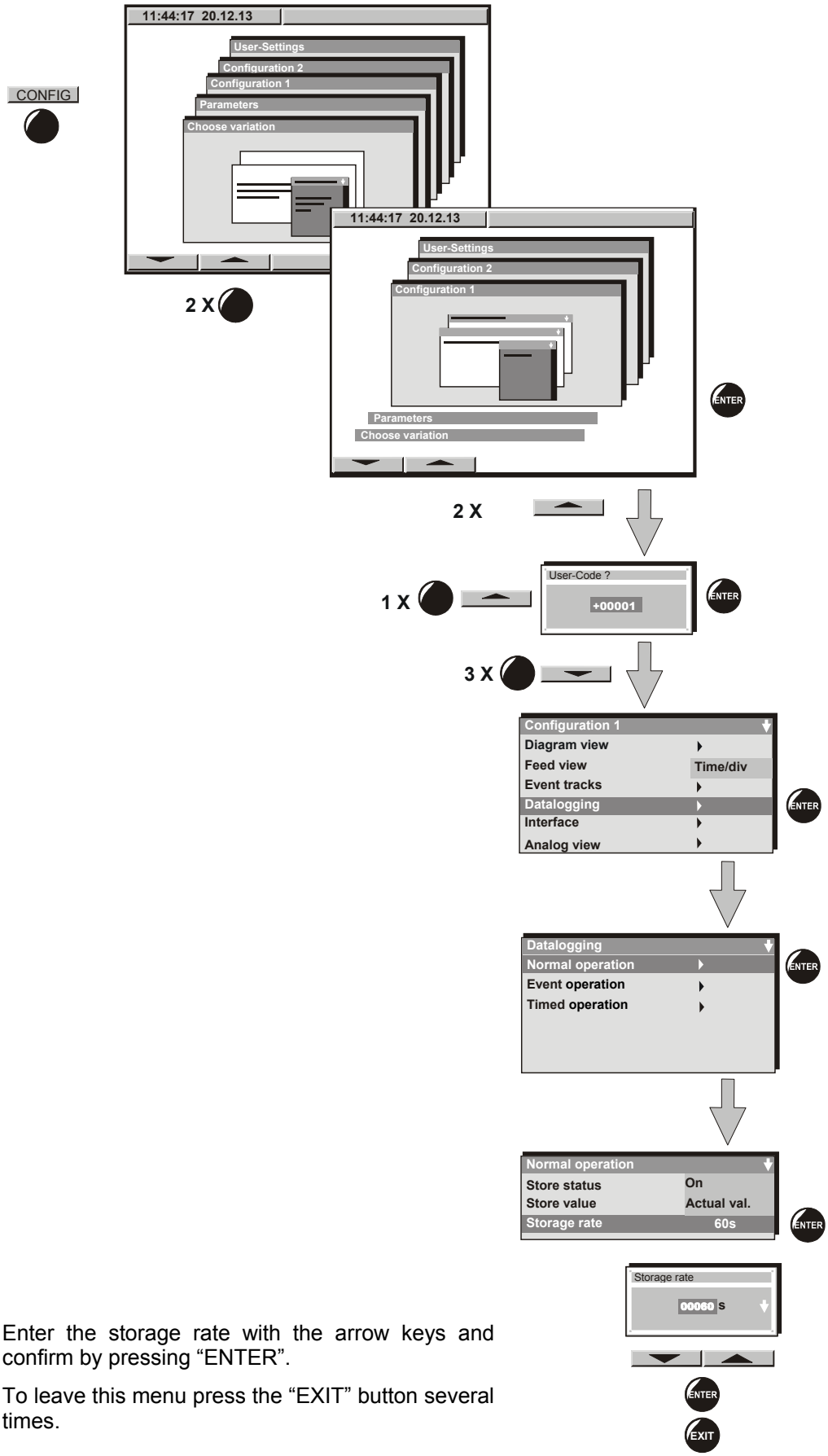
CAUTION

Setting the storage rate clears the measured-value memory.

Danger of information loss.

➢ Change the storage rate ONLY if the previously registered data is no longer needed.

7.1 Setting the storage rate



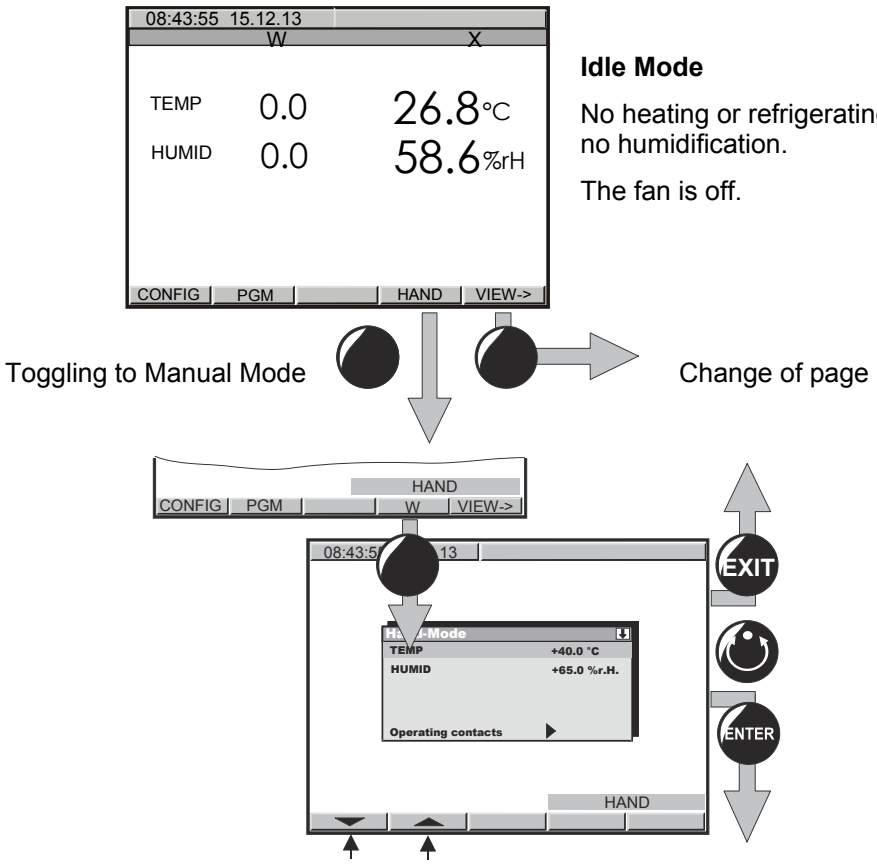
Enter the storage rate with the arrow keys and confirm by pressing “ENTER”.

To leave this menu press the “EXIT” button several times.

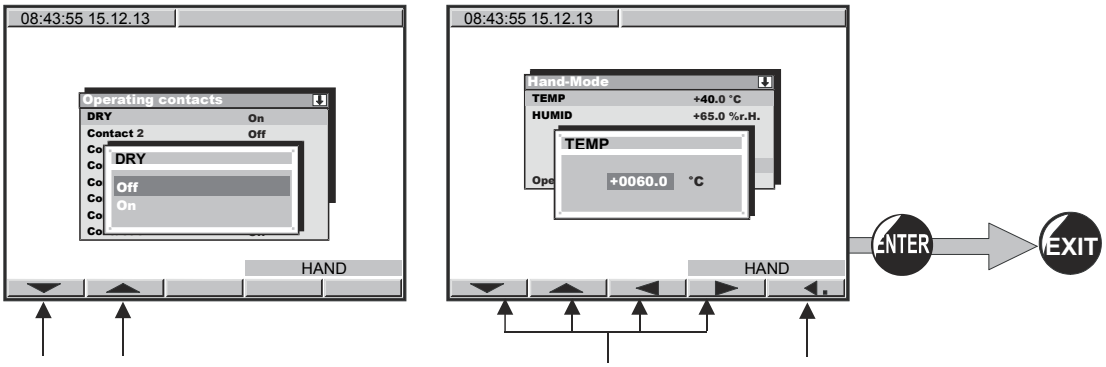
8. Manual Mode

In Manual Mode (HAND) you can enter a temperature set-point, a humidity set-point, and the switching-state of up to 8 operation lines. Operation line 1 can be used to control the bedew protection (chap. 10). Operation lines 2 to 5 serve to switch any device connected to the zero-voltage relay outputs (DIN sockets (11) and (12), chap. 11). Operation line 8 releases the compressed air dryer (option, chap. 16.7). The other operation lines are non-functional. All settings remain valid in Manual Mode (HAND) until the next manual change, if the chamber had been turned off or in case of toggling to Idle Mode or Program Mode (AUTO).

8.1 Set-point entry



Toggling between temperature set-point, humidity set-point, and operation lines.



Arrow buttons to select the operation lines
(Operation line 1 = bedew protection)

Arrow buttons to enter the value

Button to move the decimal point

	Unlock the keyboard locking (option, chap. 16.5) via the key switch to enter the set-point.

Ranges:

Temperature MKF	Setting range (range -50 °C up to -40 °C not provided for operation)	-50 °C / *-58°F* up to 180 °C / *356°F*
	Control range without humidity	- 40ºC / *-40°F* to + 180ºC / *356°F*
	Control range in climatic operation	+ 10 °C / *50°F* up to +95 °C / *203°F*
	Control range in climatic operation, with optional compressed air dryer	0 °C / *32 °F* up to +95 °C / *203°F*
Temperature MKFT	Setting range (range -80 °C up to -70 °C not provided for operation)	-80 °C / *-112 °F* up to 180 °C / *356°F*
	Control range without humidity	-70 ºC / *-94 °F* up to 180 °C / *356°F*
	Control range in climatic operation	+ 10 °C / *50°F* up to +95 °C / *203°F*
	Control range in climatic operation, with optional compressed air dryer	0 °C / *32 °F* up to +95 °C / *203°F*
Humidity	Setting range	0 % r.H. up to 100 % r.H.
	Control range	10 % r.H. up to 98 % r.H.
	Control range with optional compressed air dryer	5 % r.H. up to 98% r.H.
	For possible combinations of temperature and humidity values without condensation, see temperature / humidity diagram in chap. 14. Outside the indicated control range for temperature and humidity the humidity system is automatically turned off. The entry of the humidity set-point 0 % r.H. permits completely turning off humidity in defined program section and thus attaining faster temperature changes.	

For the control range of temperature and relative humidity, see the temperature / humidity diagram (chap. 14).

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. 10 °C above the controller temperature set-point.

We recommend keyboard locking (option, chap. 16.5.) during operation.

In case of the optional temperature safety device (chap. 12.3), check and, if necessary, adjust the temperature limits entered there.

In Manual Mode, no program can be started. Set-points can be entered for temperature and for humidity. The actual values equilibrate to these set-points.

When pushing the EXIT button in Manual Mode, the controller changes to Idle Mode. The set-points entered in Manual Mode remain saved.

When incidentally pressing the EXIT button during Manual Mode operation, the controller will change to Idle Mode and thus will not adjust any longer to the program set-points.

We recommend keyboard locking (option, chap. 16.5.) during operation.

For a negative set-point entry, enter the numerical value first and then the minus sign (-).

When operating without humidity (humidity switch (4) OFF), set the humidity set-point in Manual Mode to 0 % r.H. in order to avoid alarms (in case of the humidity deviating by more than +/- 5% from the set-point).

8.2 Performance after power failure in Manual Mode

In Manual Mode (HAND), all functions return exactly to the same status the chamber had before power failure. The set-points are immediately resumed, the switching states of the operation lines are conserved. No error message indicating that a power failure has taken place is displayed. However, the power failure will appear in the event list.

9. Program operation

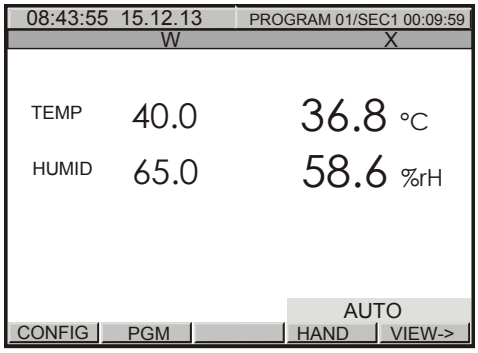
The 2-channel program controller MB1 permits programming temperature and humidity cycles. It offers 25 program memory positions with 100 program sections each. The total cumulative number of program sections is limited to 500. It is not possible to link several programs.

For each program section you can enter a temperature set-point, a humidity set-point, and the switching state of up to 8 operation lines. Operating line 1 can be used to control the bedew protection (chap. 10). Operation lines 2 to 5 serve to switch any device connected to the zero-voltage relay outputs (DIN sockets (11) and (12), chap. 11). Operation line 8 releases the compressed air dryer (option, chap. 16.7). The other operation lines are non-functional.

Programming is possible directly by the keypad of the controller or graphically by the software APT-COM™ 3 DataControlSystem (option, chap. 16.1) specially developed by BINDER.

9.1 Menu-based program entry

Display showing the initial normal display in Idle Mode



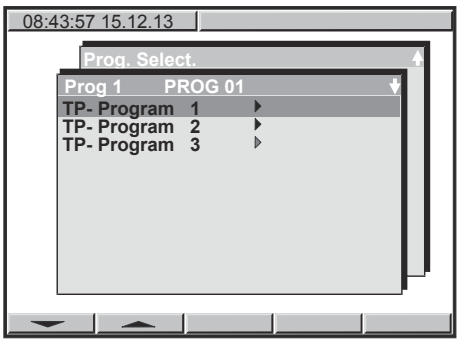
Press the “PGM” button. The window **program selection** appears

Select a program via the arrow keys and confirm by pressing ENTER

The following display serves to select a **subroutine**:

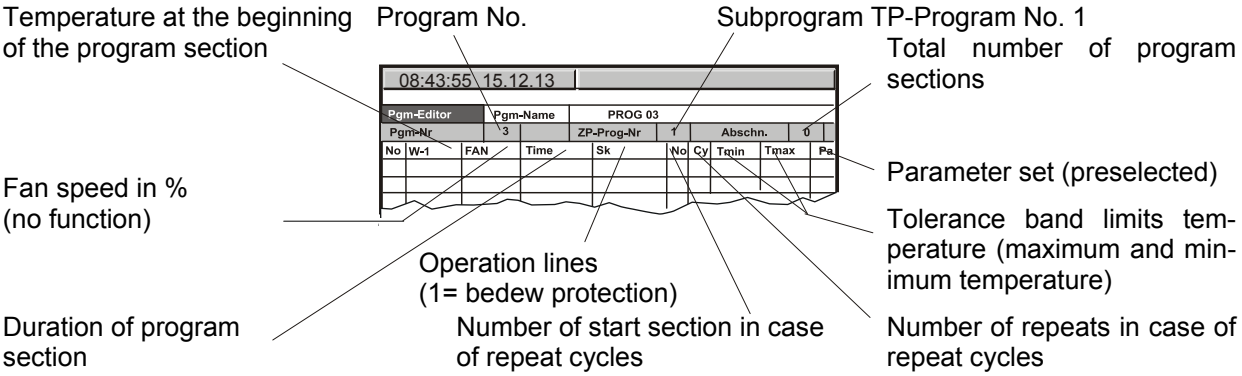
TP-Program 1	**Entry of the temperature values and the switching states of operation lines**
TP-Program 2	**Entry of the humidity values**
TP-Program 3	no function

9.2 Entering the temperature values and the switching states of the operation lines



Select the first subroutine "**TP-Program 1**" and confirm with ENTER.

A **program table** will appear, which is initially empty until you enter the temperature values. You can now enter the temperature program.



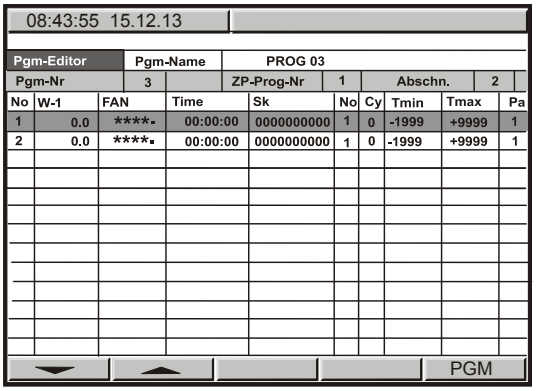
You can enter **Program sections** into this program table.

Press the "PGM" button. An inquiry display appears allowing you to enter or delete individual program sections:

In this view, new program lines can be entered or deleted:

new	New lines are added below in the table
insert	New lines are added above a previously selected line
delete	Individual lines that have been selected previously are deleted

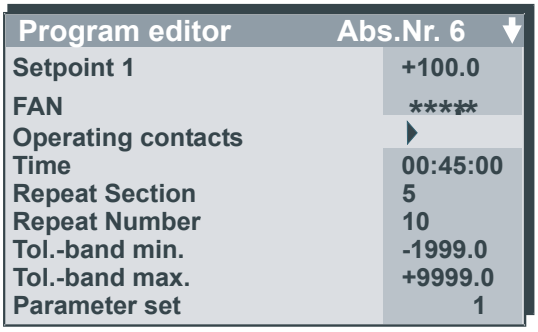
Create as many lines, i.e. program sections, as desired. As a next step, you can enter values into these lines. It is possible to add supplementary lines later or to delete individual lines at any time.



To enter values, select the corresponding line via the arrow keys.

Press the ENTER button. The **program editor** appears.

Enter the individual values of the selected program section.



Setpoint 1	Temperature at the start of the program section
FAN	Fan speed in % (no function)
Operating contacts	Operation lines ON/OFF (chap. 10, 11, and 16.7)
Time	Duration of the program section
Repeat Section	No. of start section in case of repeat cycles
Repeat Number	No. of repeats in case of repeat cycles
Tol.-band min.	Temperature limits (maximum / minimum temperature) **(In case of exceeding: temporary program stop)**
Tol.-band max.	
Parameter set	Pre-selected value (Do NOT change!)

Select the parameters via the arrow keys and confirm by pressing ENTER.

Then enter the values via the arrow keys, and confirm the entry by pressing ENTER.

	For a negative set-point entry, enter the numerical value first, and then the minus sign (-).

	With set-point type “**Limit**”, the user shall adapt the safety controller (chap. 12.2) to the highest temperature set-point value of the program actually used. Check the safety controller for each temperature program and change it if necessary. Set the safety controller set-point by approx. 10 °C above the highest temperature set-point of the program.

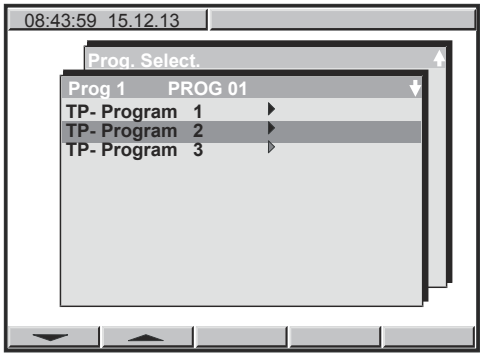
	In case of the optional over-/under temperature safety device (chap. 12.3), check also the temperature limits entered there, and adjust them if necessary.

Performance after completing the program:

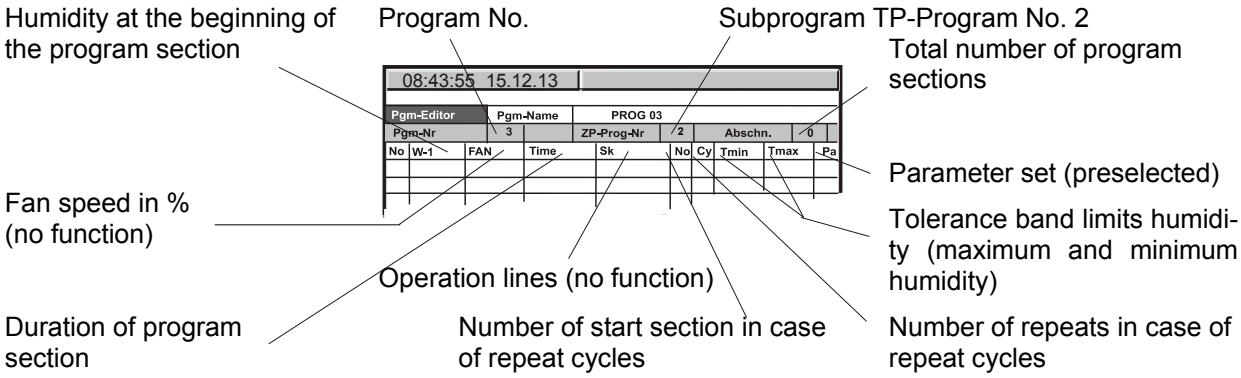
The controller changes to Idle Mode. Heating, refrigeration, and humidification are inactive; the chamber approximates ambient temperature.

The fan is off. The switching states of the operation lines are OFF.

9.3 Entering the humidity values



Select the second subroutine "**TP-Program 2**" and confirm by pressing ENTER. A program table will appear, which is initially empty until you enter the humidity values. You can now enter the humidity program.



Further proceeding is equivalent to the temperature value entry described in chap. 9.2.

	The entry of a humidity set-point 0 % r.H. permits completely turning off humidity in defined program sections and thus attaining faster temperature changes.

Time course of the subroutines

When starting the overall program, both subroutines (TP-Program 1 and TP-Program 2) run off synchronously. They should be of the same duration because each of the subroutines becomes inactive after run-off (i.e., no heating or refrigeration, switching states of the operation lines OFF, and the fan is off after ZP 1 is completed, no humidification after ZP 2 is completed). When the complete program is finished, the controller changes to Idle Mode. Temperature and humidity proceed towards ambient values.

Performance after completing the program:

The controller changes to Idle Mode. Heating, refrigeration, and humidification are inactive; the chamber approximates ambient temperature.

The fan is off. The switching states of the operation lines are OFF.

9.4 Selecting between set-point ramp and set-point step

Set-points always refer to the start of a program section, i.e., at the beginning of each program section the entered set-point is targeted. During program section operation, the temperature or humidity gradually passes to the set-point entered for the next program section.

By appropriate planning of the program section timing, you can enter all kinds of temperature and humidity transitions.

- **Gradual temperature / humidity changes "set-point ramp"**

  The set-point changes its value gradually while proceeding from one program section to the next one during the programmed section length. The actual temperature or humidity value (X) follows the continually moving set-point (W) at any time.

- **Program sections with constant temperature / humidity**

  The initial values of two subsequent program sections are identical; so the temperature or humidity remains constant during the whole time of the first program section.

- **Sudden temperature / humidity changes "set-point step"**

  Steps are temperature or humidity changes (ramps) that occur during a very short interval. A section with a different set-point follows two program sections with an identical set-point. If the duration of this transitional program section is very short (minimum entry 1 sec), the temperature or humidity change will proceed rapidly within the minimum amount of time.

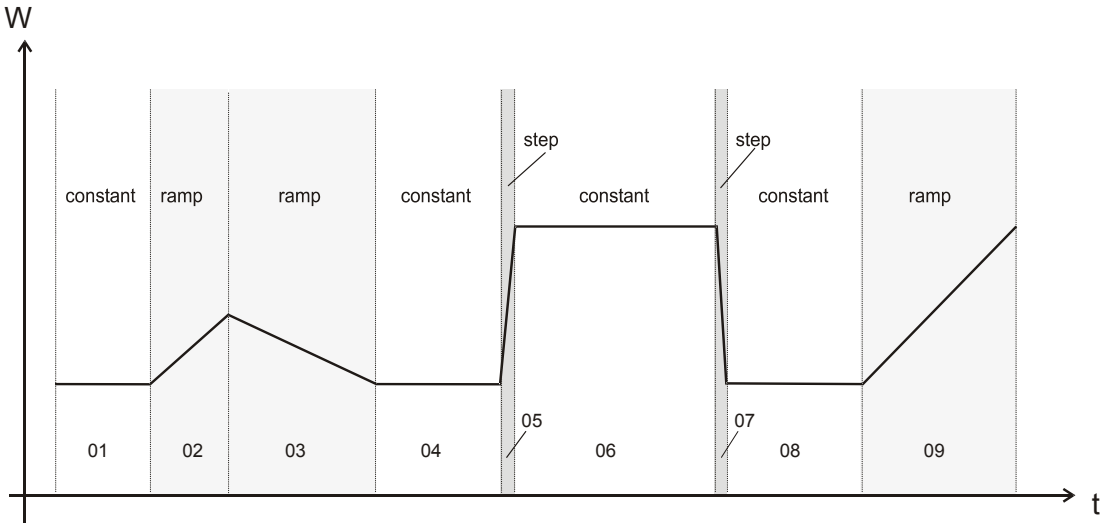


Figure 17: Possible temperature or humidity transitions

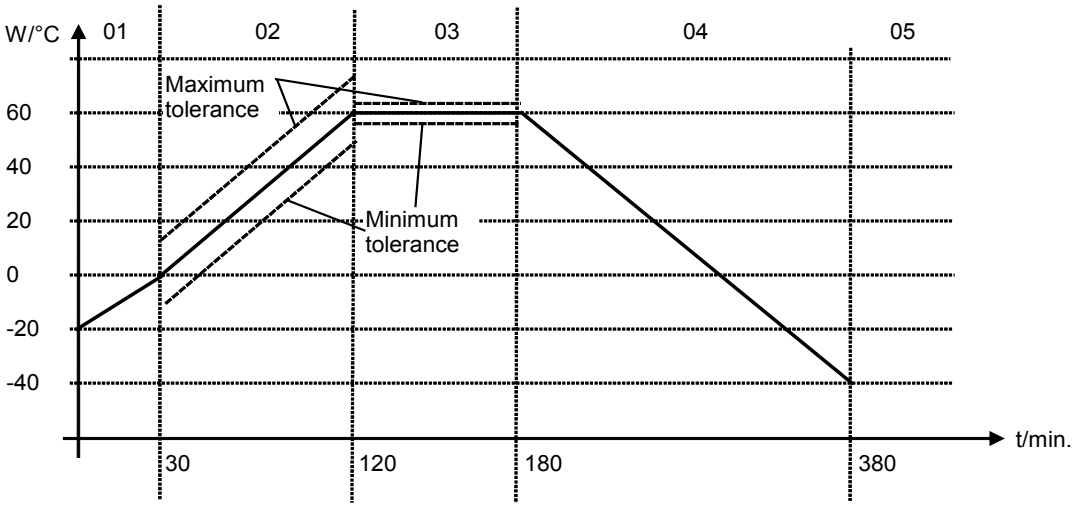
The following chapter offers examples of programming a set-point ramp and a set-point step.

9.5 Program entry as set-point ramp or as set-point step

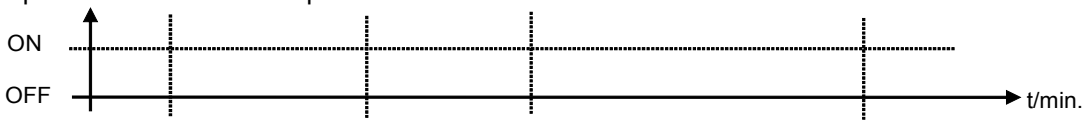
In order to avoid incorrect programming, we recommend plotting both the temperature and humidity profiles (chart templates in chap. 9.11 and 9.12) and entering the values into a table (templates in chap. 9.13 and 9.14).

The controller provides 8 operation lines that can be activated or de-activated for each program section. Operating contact 1 can be used to control the bedew protection (chap. 10). Operation lines 2 to 5 serve to switch any device connected to the zero-voltage relay outputs (DIN sockets (11) and (12), chap. 11). Operation line 8 releases the compressed air dryer (option, chap. 16.7). The other operation lines are non-functional.

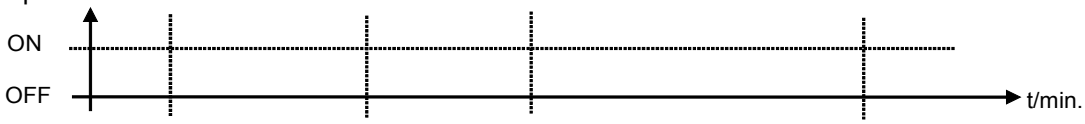
Program entry as set-point ramp (example of a temperature program)



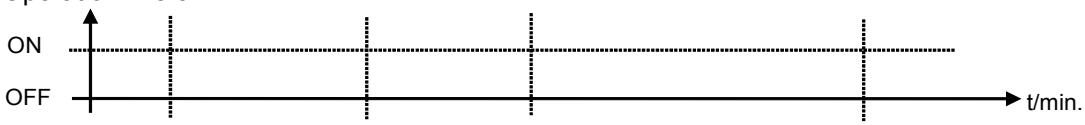
Operation line 1 = bedew protection



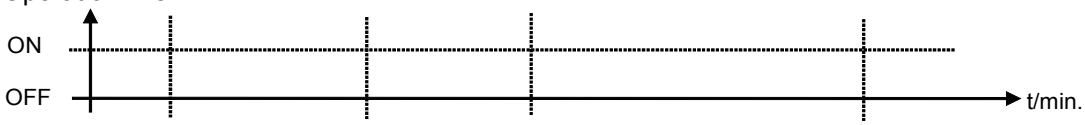
Operation line 2



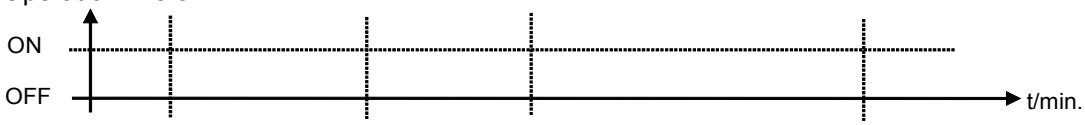
Operation line 3



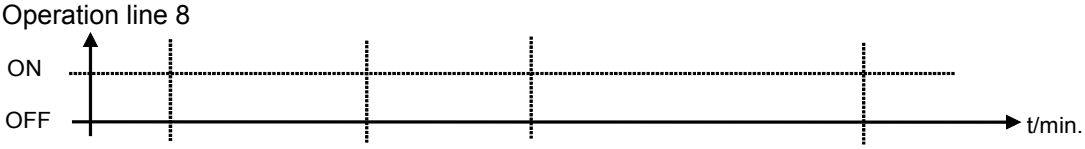
Operation line 4



Operation line 5



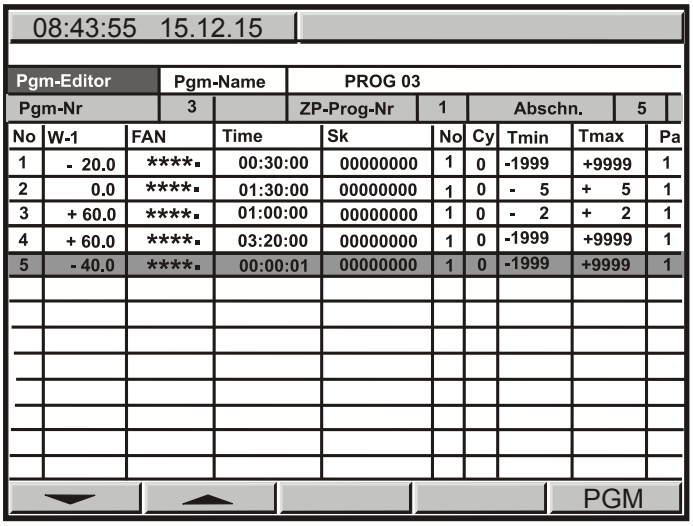
Operation line 8



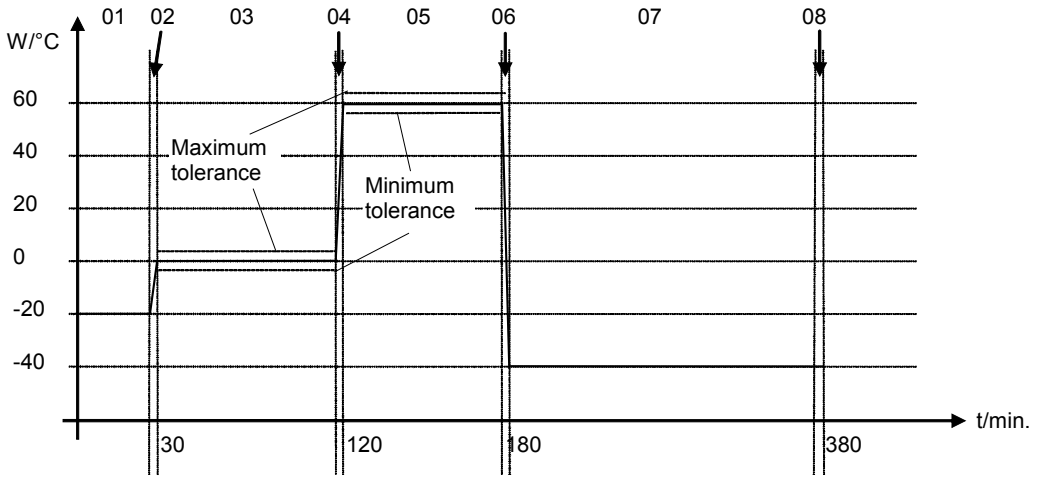
Program table corresponding to the diagram above:

Section	Tem-perature set-point	Fan	Section time	Operation lines								Target section	No. of cycles	Minimum tolerance	Maximum tolerance
				8	7	6	5	4	3	2	1				
No.	**W-1**	**FAN**	**Time**	**Sk**								**No**	**Cy**	**Tmin**	**Tmax**
01	-20	****.	00:30:00	0	0	0	0	0	0	0	0	1	0	-1999	+9999
02	0	****.	01:30:00	0	0	0	0	0	0	0	0	1	0	-5	+5
03	60	****.	01:00:00	0	0	0	0	0	0	0	0	1	0	-2	+2
04	60	****.	03:20:00	0	0	0	0	0	0	0	0	1	0	-1999	+9999
05	-40	****.	00:00:01	0	0	0	0	0	0	0	0	1	0	-1999	+9999

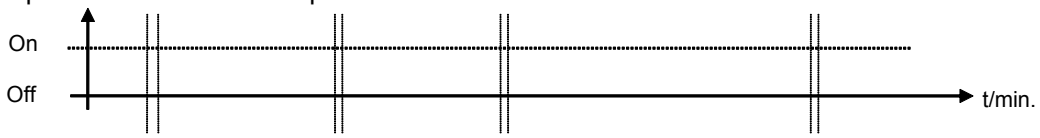
Now enter the values of the above program table into one of the 25 program places of the controller MB1:



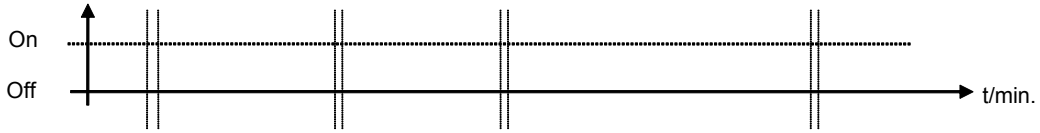
Program entry as set-point step (example of a temperature program)



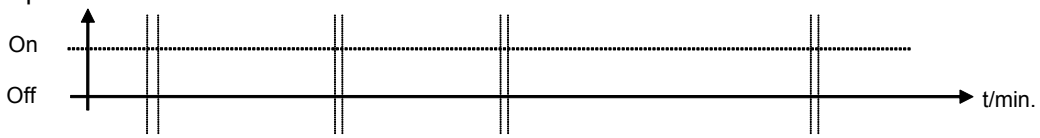
Operation line 1 = bedew protection



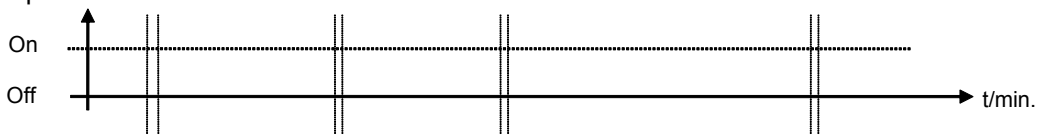
Operation line 2



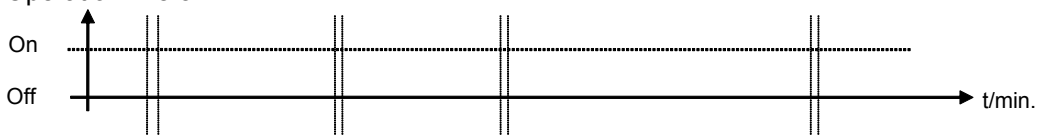
Operation line 3



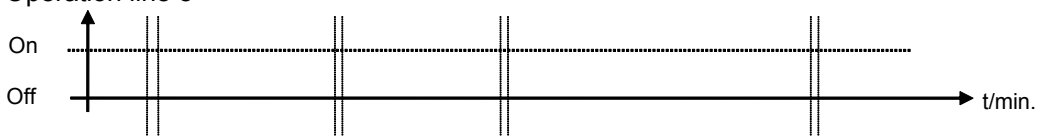
Operation line 4



Operation line 5



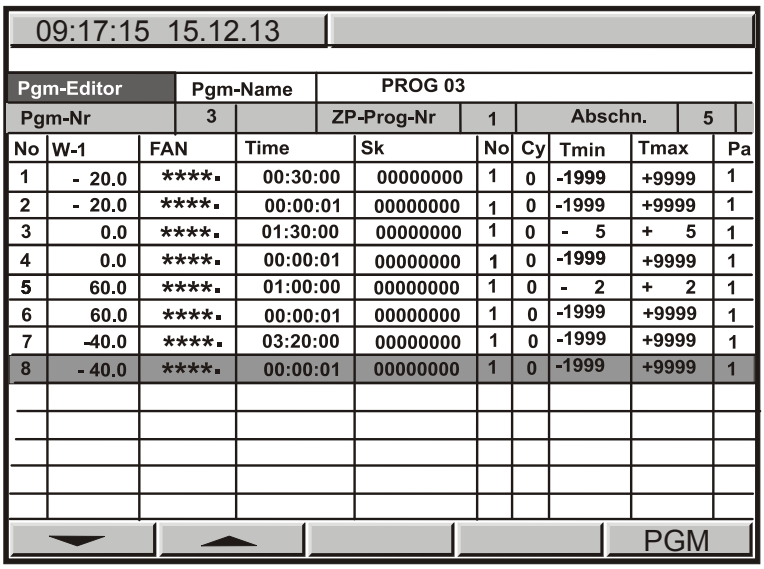
Operation line 8



Program table corresponding to the diagram above:

Section	Tem-perature set-point	Fan	Section time	Operation lines								Target section	No. of cycles	Minimum tolerance	Maximum tolerance
				8	7	6	5	4	3	2	1				
No.	**W-1**	**FAN**	**Time**	**Sk**								**No**	**Cy**	**Tmin**	**Tmax**
01	-20	****.	00:30:00	0	0	0	0	0	0	0	0	1	0	-1999	+9999
02	-20	****.	00:00:01	0	0	0	0	0	0	0	0	1	0	-1999	+9999
03	0	****.	01:30:00	0	0	0	0	0	0	0	0	1	0	-5	+5
04	0	****.	00:00:01	0	0	0	0	0	0	0	0	1	0	-1999	+9999
05	60	****.	01:00:00	0	0	0	0	0	0	0	0	1	0	-2	+2
06	60	****.	00:00:01	0	0	0	0	0	0	0	0	1	0	-1999	+9999
07	-40	****.	03:20:00	0	0	0	0	0	0	0	0	1	0	-1999	+9999
08	-40	****.	00:00:01	0	0	0	0	0	0	0	0	1	0	-1999	+9999

Now enter the values of the above program table into one of the 25 program places of the controller MB1:



	For rapid transition phases, do NOT program any tolerance limits in order to permit maximum heating, refrigerating, and humidification speed.

9.6 Information on programming different temperature or humidity transitions

- For the end value of the desired cycle, add an additional section (in the examples section 05 for set-point ramp and section 08 for set-point step) with a section time of at least one second. Otherwise, the program will stop one section too early because the program line is incomplete.
- **Program interruption (rest function):** Press key "HAND" in order to interrupt the program. During this interruption time, the controller equilibrates to the set-points of the section actually reached. The display reads AUTO HAND on the bottom right instead of AUTO (program operation). This state lasts until you press the EXIT key, then the program continues. If you want to cancel the interrupted program, keep the AUTOMATIC key pressed down for at least 5 seconds.
- **Tolerance band function:** If the tolerance minimum is set to e.g. -5 and the tolerance maximum to e.g. +5, the program is interrupted when the actual value deviates by 5 °C resp. 5 % r.H. or more from the set-point value. During this interruption time, the controller equilibrates to the set-points of the section actually reached. The display reads AUTO HAND on the bottom right instead of AUTO (program operation). You can enter different values for tolerance maximum and minimum for each section. When the temperature or humidity are situated within the entered tolerance limits, the program will continue automatically, and the indication AUTOHAND will disappear. If you want to cancel the interrupted program, keep the AUTOMATIC key pressed down for at least 5 seconds.

	Programming of tolerances can extend program duration.

  Therefore, the duration of the program may be extended due to the programming of tolerances.

  The number -1999 for the tolerance minimum means “-∞”, and the number 9999 for the tolerance maximum means “+ ∞“. Entry of these numbers will never lead to program interruption.

  When leaving the tolerance bandwidth in one of the subroutines, the course of time of the whole program, i.e., of both subroutines, is halted.

  During the rapid transition phase, do NOT program any tolerance limits in order to permit the maximum heating, refrigerating, or humidification speed.
- The initial setting ****.* of the fan speed corresponds to the maximal speed of 100 %. This setting cannot be changed.
- Programming is stored even in case of power failure or after turning off the chamber.
- The controller memory can store a maximum of 25 programs. Each program cannot exceed 100 sections. It is not possible to link programs. The total number of program sections of all programs is limited to a maximum of 500.
- When the program is finished, the controller changes to Idle Mode.
- Running program (display AUTO): If you incidentally press the EXIT or AUTOMATIC button, the controller will change to Idle Mode and thus will not adjust any longer to the program set-points
- Program interruption with rest function (display AUTO HAND): If you press the EXIT key, the program continues. Button ENTER is non-functional. To cancel the program, keep the AUTOMATIC button pressed down for at least 5 seconds.
- Program interruption with tolerance band function (display AUTO HAND): Buttons EXIT and ENTER are non-functional. To cancel the program, keep the AUTOMATIC button pressed down for 5 seconds.

General note:

The controller MB1 displays more menu entries than those described in this manual. These are password protected because they are relevant for service purposes only and the user must not modify them. Only service authorized by BINDER can access these entries.

9.7 Repetition of a section or several sections within a program

Here we use the example of a set-point ramp temperature program of chap. 9.5. The shaded sections 02 and 03 shall be repeated e.g. 30 times.

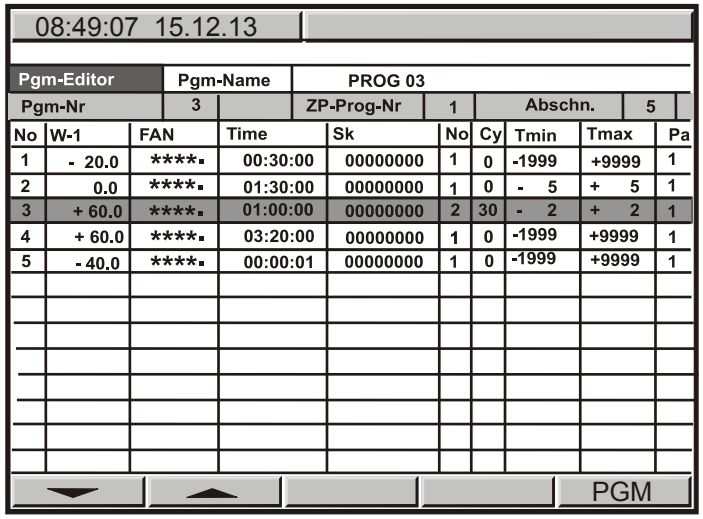
Section	Temperature set-point	Fan	Section time	Operation lines	Target section	No. of cycles	Minimum tolerance	Maximum tolerance
No.	**W-1**	**FAN**	**Time**	**Sk**	**No**	**Cy**	**Tmin**	**Tmax**
01	-20	****.	00:30:00	00000000	1	0	-1999	+9999
02	0	****.	01:30:00	00000000	1	0	-5	+5
03	60	****.	01:00:00	00000000	1	0	-2	+2
04	60	****.	03:20:00	00000000	1	0	-1999	+9999
05	-40	****.	00:00:01	00000000	1	0	-1999	+9999

The following table shows the program that results, whereby the differences to the table above are shaded.

Section	Temperature set-point	Fan	Section time	Operation lines	Target section	No. of cycles	Minimum tolerance	Maximum tolerance
No.	**W-1**	**FAN**	**Time**	**Sk**	**No**	**Cy**	**Tmin**	**Tmax**
01	-20	****.	00:30:00	00000000	1	0	-1999	+9999
02	0	****.	01:30:00	00000000	1	0	-5	+5
03	60	****.	01:00:00	00000000	**2**	**30**	-2	+2
04	60	****.	03:20:00	00000000	1	0	-1999	+9999
05	-40	****.	00:00:01	00000000	1	0	-1999	+9999

Sections 02 and 03 will be executed in total 31 times; only then will the program continue.

Entry of the values into the display program table:



No	W-1	FAN	Time	Sk	No	Cy	Tmin	Tmax	Pa
1	- 20.0	****.	00:30:00	00000000	1	0	-1999	+9999	1
2	0.0	****.	01:30:00	00000000	1	0	- 5	+ 5	1
3	+ 60.0	****.	01:00:00	00000000	2	30	- 2	+ 2	1
4	+ 60.0	****.	03:20:00	00000000	1	0	-1999	+9999	1
5	- 40.0	****.	00:00:01	00000000	1	0	-1999	+9999	1

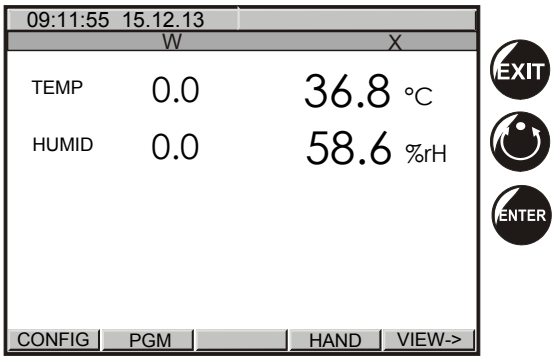
To have sections repeated indefinitely, enter the number of cycles “Cy” as -1.

9.8 Performance after power failure in Program Mode

The program is resumed at the point where the interruption occurred with the latest set-points reached during the program run. The power failure is noted in the event list. No error message is displayed indicating that a power failure had taken place.

9.9 Starting a previously entered program

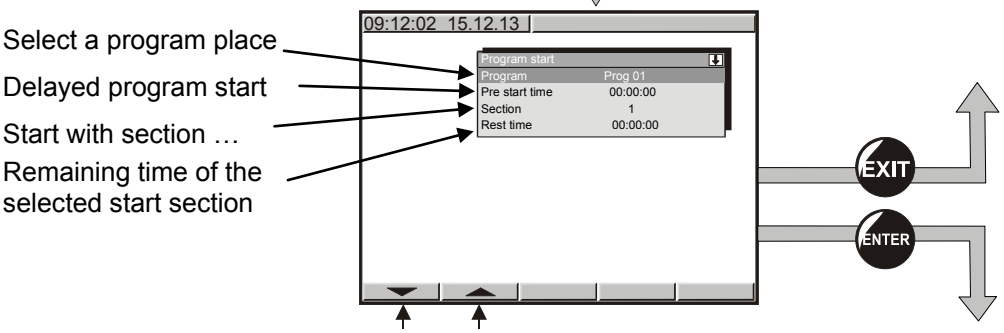
The program has to be previously entered via a programming table (chap. 9.5, 9.7).



Idle mode

No heating or refrigerating function, no humidification.

The fan is off.



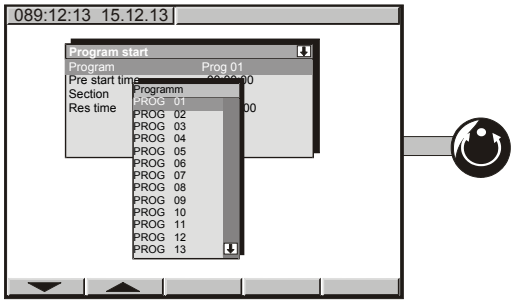
Select a program place

Delayed program start

Start with section …

Remaining time of the selected start section

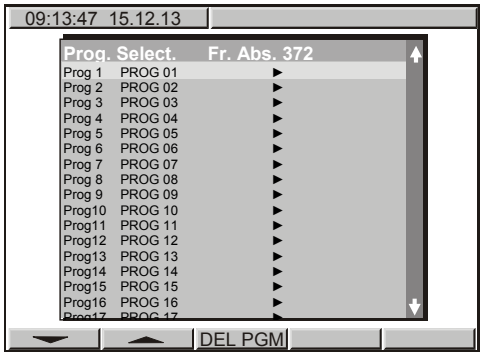
Arrow buttons to select the parameter to be set



Press the AUTOMATIC button to start the program

Arrow buttons to select the program

9.10 Deleting a program



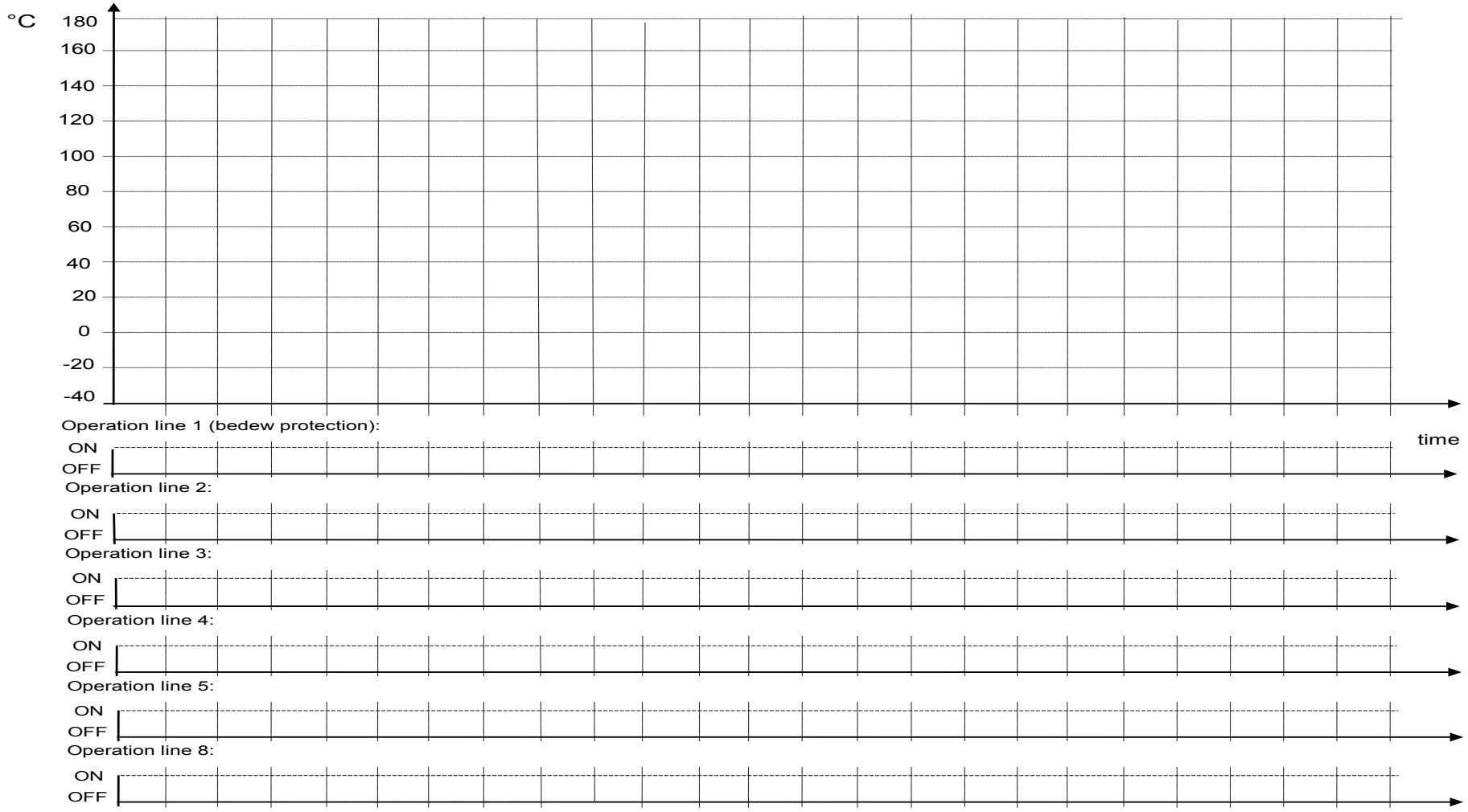
Select a program via the arrow keys

Press button ⫶⫶⫶ to delete the selected program.

To delete individual program sections (table lines) use the inquiry display for adding or deleting program sections (chap. 9.1).

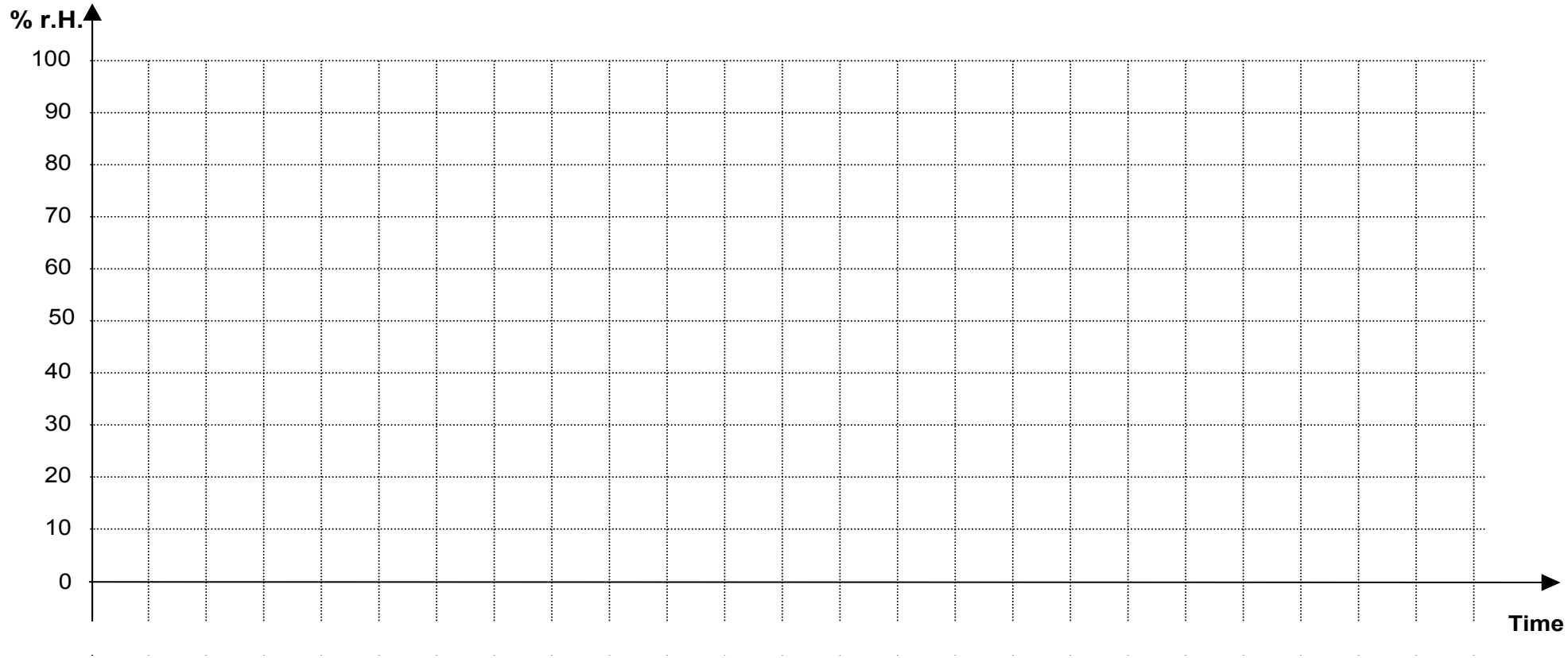
9.11 Temperature profile and operation lines template

Program author:	**Program No. (1 to 25):**	**Operation line 2:**	**Operation line 5:**
Program title:	**Date:**	**Operation line 3:**	**Operation line 8:**
Project:	**Operation line 1: bedew protection**	**Operation line 4:**	**1 = ON = active 0 = OFF = not active**



9.12 Humidity profile template

Programmer :		**Program No. (1 to 25):**		**Date:**	
Program title:		**Operation lines are without function**			
Project:					



9.13 Program table template for temperature and operation lines

Program author:	**Program No. (1 to 25):**	**Operation line 2:**	**Operation line 5:**
Program title:	**Date:**	**Operation line 3:**	**Operation line 8:**
Project:	**Operation line 1: bedew protection**	**Operation line 4:**	**1 = ON = active 0 = OFF = not active**

Section number No.	Set-point W-1	Fan speed [%] FAN	Section time Time	Operation lines Sk						Start section for repeat cycles No	Number of repeat cycles Cy	Tolerance-minimum Tmin	Tolerance-maximum Tmax	Parameter set Pa
				8	5	4	3	2	1					
01		****.												1
02		****.												1
03		****.												1
04		****.												1
05		****.												1
06		****.												1
07		****.												1
08		****.												1
09		****.												1
10		****.												1
11		****.												1
12		****.												1
13		****.												1
14		****.												1
15		****.												1
16		****.												1
17		****.												1
18		****.												1
19		****.												1
20		****.												1

No function Default setting

9.14 Program table template for humidity

Programmer ::		**Program No. (1 to 25):**		**Date:**	
Program title:		**Operation lines are without function**			
Project:					

Section No.	Set-point Humidity W-1	Fan speed (no function) FAN	Section time Time	Operation lines (no function) Sk	Start section for repeat cycles No	Number of repeat cycles Cy	Tol. minimum Humidity Tmin	Tol. maximum Humidity Tmax	Parameter set Pa
01		****.		00000000					1
02		****.		00000000					1
03		****.		00000000					1
04		****.		00000000					1
05		****.		00000000					1
06		****.		00000000					1
07		****.		00000000					1
08		****.		00000000					1
09		****.		00000000					1
10		****.		00000000					1
11		****.		00000000					1
12		****.		00000000					1
13		****.		00000000					1
14		****.		00000000					1
15		****.		00000000					1
16		****.		00000000					1
17		****.		00000000					1
18		****.		00000000					1
19		****.		00000000					1
20		****.		00000000					1
		no function		no function					Default setting

10. Bedew protection facility (Operation line 1)

When operating the chamber without humidification, the bedew protection condensates the chamber humidity at the coldest point in order to avoid the samples becoming wet by condensation. Bedew protection is performed by the evaporator and can be programmed On/Off via operation line 1 in Manual Mode (HAND) and in Program Mode (AUTO).

	Use the bedew protection only if it is necessary to prevent condensation at the charging material.

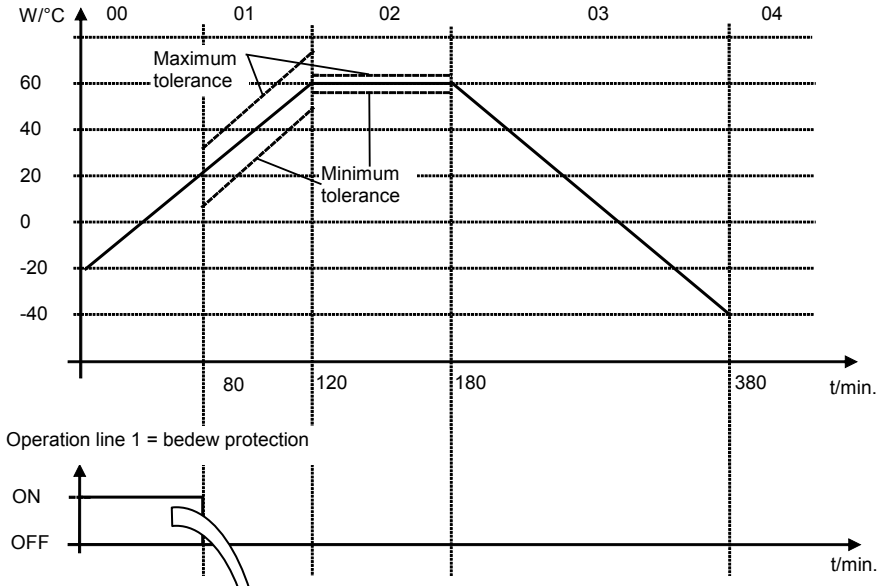
	Use the bedew protection only when operating the chamber without humidification.

When the bedew protection is enabled (operation line 1 = On) the refrigeration machine keeps operating within warming-up phases (On = refrigeration machine operating, Off = refrigeration machine off).

- **If possible, use the bedew protection only during warm-up phases.** If necessary, you can also activate it during hold phases.
- **Do NOT use the bedew protection above a temperature set-point of +20 °C / *68°F* maximum.**

To obtain optimal warming results without condensation on the samples, program a heating gradient of approx. 0.5 °C/min.

Example:



08:43:55 15.12.13

Pgm-Editor	Pgm-Name	PRO(03						
Pgm-Nr	3	ZP-Prog	1	Abschn.	5			

Nr	W-1	FAN	Time	Sk	No	Cy	Tmin	Tmax	Pa
1	- 20.0	****.	01:20:00	00000001	1	0	-1999	+9999	1
2	+ 20.0	****.	00:40:00	00000000	1	0	- 5	+ 5	1
3	+ 60.0	****.	01:00:00	00000000	1	0	- 2	+ 2	1
4	+ 60.0	****.	03:20:00	00000000	1	0	-1999	+9999	1
5	- 40.0	****.	00:00:01	00000000	1	0	-1999	+9999	1

PGM

In the program table, the state of operation line 1 for bedew protection is represented in the column “Sk”:

On = 0000000**1**

Off = 0000000**0**

Example:

Operation line 1 is activated in the first program section and remains active up to 20 °C / *68°F*.

Then the refrigeration machine turns off automatically.

Depending on size, material, and shape of the charging material and on the heating-up rate, condensation may form despite the activated bedew protection. This condensation is, however, reduced compared to the state without bedew protection.

11. Zero-voltage relay outputs via operation lines 2 to 5

Operation lines 2 to 5 serve to switch any device connected to the zero-voltage relay output (DIN sockets (11) and (12) located in the lateral control panel). They can be programmed ON/OFF in Manual Mode (chap. 8) as well as in Program Mode (AUTO, chap. 9) via operation lines 2 to 5.

Connection for operation lines 2 and 3 occurs via DIN socket (11), connection for operation lines 4 and 5 via DIN socket (12) in the lateral control panel:

Figure 18: Pin configuration of DIN sockets (11) left and (12) right

DIN socket (11):

Operation line 2	Operation line 3
1 Pin 1: Pin 2 Pin 2: Make	4 Pin 4: Pin 5 Pin 5: Make

DIN socket (12):

Operation line 4	Operation line 5
1 Pin 1: Pin 2 Pin 2: Make	4 Pin 4: Pin 5 Pin 5: Make

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

DANGER

Electrical hazard.
Danger of death.
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.

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. 20 °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 Safety controller (over-temperature safety device class 2)

The chamber is equipped with an over temperature safety device class 2 acc. to DIN 12880:2007. It is designated as the “safety controller”. This second, electrically independent temperature controller takes over at a selectable set-point in case of fault. It serves to protect the charging material against extremely high temperatures.

	With the option over-/under temperature safety device class 2 (chap. 12.3), the safety controller must be set to maximum temperature.

The message “TEMPERATURE LIMIT” on the controller display indicates safety controller activity. The safety controller controls the chamber to the entered safety controller set-point until the temperature inside the chamber returns below this temperature and until you then reset the alarm message by button RESET.

	Regularly check the safety controller setting for set-point type “Limit” or “Offset” • in Manual 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. 10 °C above the highest temperature set-point.

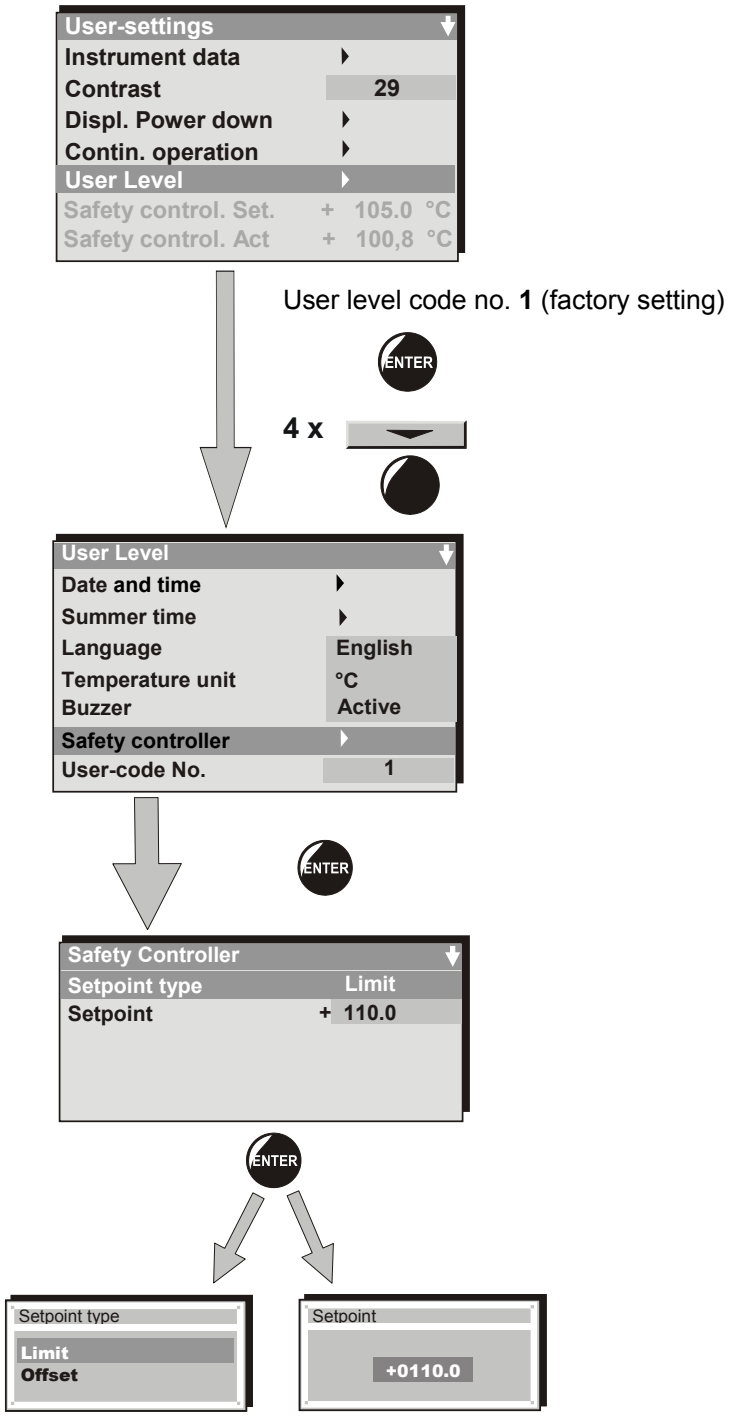
Safety controller set-point types:

Limit	Absolute maximum permitted temperature value. Example: Temperature set-point 100 °C/ *212 °F* Limit value (safety controller set-point) set to 110 °C.
Offset	Maximum over temperature above the active temperature set point. The maximum temperature changes internally and automatically with every set-point change it. Example: Temperature set-point 100 °C / *212 °F* Offset value (safety controller set-point) set to 10 °C.

	Do NOT change the temperature unit from °C to °F.

Checking and setting safety controller set-point type and safety controller set-point:

Unlock the keyboard locking (option, chap. 16.5).



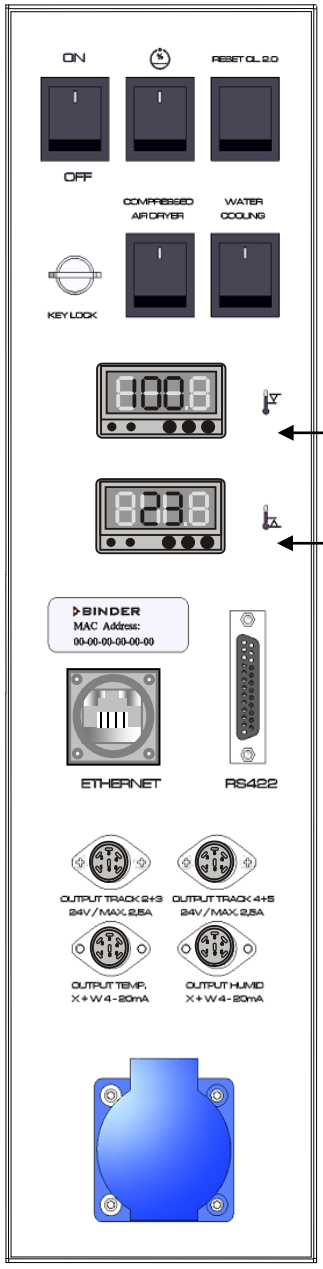
In the menu “User Level” select the submenu “Safety controller”.

- Select the safety controller set-point type “Limit” or “Offset” in the field “Setpoint type”
- Enter the value for “Limit” or “Offset” in the field “Setpoint”.

Lock afterwards the keyboard locking (option, chap. 16.5).

For temperature disturbances see alarm indications, chap. 13.

12.3 Over/under temperature safety device class 2 (option)



The over-/under temperature safety device consists of two entry modules (9a) and (9b) located in the lateral control panel. Both modules can be set from -50 °C / *-58 °F* (MKF) or -80 °C / -112 °F (MKFT) up to 200 °C / *392 °F* and serve to define the maximum high and low temperature limits.

	With this option, the safety controller (chap. 12.2) must be set to maximum temperature.

(9a) Upper module: Entry of higher limit temperature.

(9b) Lower module: Entry of lower limit temperature.

When the temperature inside the chamber leaves this tolerance bandwidth, the temperature control, and herewith the heating and refrigeration, are turned off permanently.

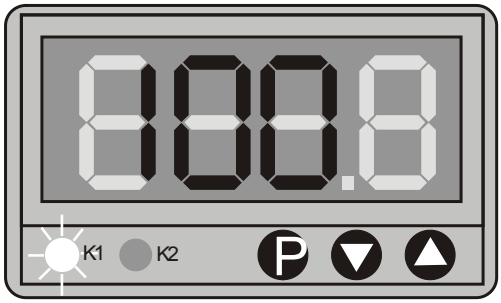
At the corresponding entry module, the red pilot lamp K1 lights up (K2 is without function).

The controller displays the alarm message „TEMP LIMIT“ (chap. 13). Additionally there is an audible alert, provided that the buzzer has not been deactivated in menu “User level”. In the graphical representation, the blue line “CLASS” is displayed enlarged (chap. 7).

Let the chamber heat up or cool down to the defined safety temperature range.

The press down RESET button (5) “RESET CL 2.0” located in the lateral control panel to re-activate the chamber. The red pilot lamp K1 goes off.

Then reset the alarm message at the controller display by controller button RESET (chap. 13).



Setting limit temperatures at modules (9a) and (9b):

- Press down button P
- The display changes to entry mode
- Enter the desired limit temperature via the arrow keys
- The entered temperature value is adopted after a few seconds. The display shows the actual temperature again.

13. Notification and alarm functions

13.1 Notification and alarm system overview (auto diagnosis system)

- Visual indications of notification or error messages are blue notes on the display of the MB1controller.
- Visual indications of an alarm messages are red notes with an alarm bell symbol.

  In addition, there is an audible alert, if you did not deactivate the buzzer in the “User level” menu (chap. 6.4).

Event	Note (blue field)	Alarm (red field)
Lack of water in the freshwater can. The chamber continues working for a few hours. In case of freshwater supply via water pipe, the water tap is closed, or the chamber is defective.	**WATER LOW** after 5 min	
Wastewater hose clogged. Check the length and location of the wastewater hose. *or* Wastewater pump or float switch in the wastewater can defective. Contact BINDER service.		**WASTEWATER** after 10 sec.
Humidifying module defective. Contact BINDER service.		**FAULT HUMID SYSTEM** immediately
Freshwater can is too empty to allow normal function, or the chamber is defective. The humidification system turns off. Fill up the water can or open the water supply. During the one-hour preheating phase: message without significance		**WATER TANK EMPTY** after 60 sec.
When manually filling up the freshwater can: Freshwater can is too full, or the chamber is defective. Suck off the water (chap. 4.2.2). The chamber functions as usual. If the message persists, contact BINDER service.		**WATER LEVEL TOO HIGH** after 60 sec.
Humidity switch OFF or humidity outside control range. No active humidification of the interior. Further dehumidification possible by refrigerating operation	**HUMID OFF** immediately	
Maintenance of the humidity module is required. Contact BINDER service.	**HUMID SERVICE** immediately	
One-hour preheating phase, no refrigerating and dehumidification functions	**1H PREHEAT PHASE** immediately	
Fault in refrigerating machine. Contact BINDER service.		**FAULT COMPRESSOR** immediately

Event	Note (blue field)	Alarm (red field)
Operation line 1 (bedew protection) activated	**DRY** immediately	
Limit value of safety device exceeded		**TEMPERATURE LIMIT** immediately
With option over/under temperature safety device class 2 (chap. 12.3):		
Exceeding the maximum / minimum temperature		**TEMP LIMIT** immediately
With option keyboard locking (chap. 16.5):		
Locked keyboard	**KEY LOCK** immediately	

The indicated intervals refer to the time after occurrence of the error or notified condition.

Turning off and on again the humidity switch (4) or turning off and on again the chamber with the main power switch (3) will reset the alarm message “FAULTHUMID SYSTEM”. In case of a fault, the message will appear again. In this case contact BINDER service.

13.2 Resetting the notification or alarm messages

The “RESET” button, which serves to acknowledge and reset the indication, will become visible automatically whenever a notification or an alarm message appears.

1. Depending on the type of error, eliminate the cause of the alarm or wait until the chamber compensates for the reason of the error.
2. Press the “RESET” button to reset the notification or alarm message.

CAUTION

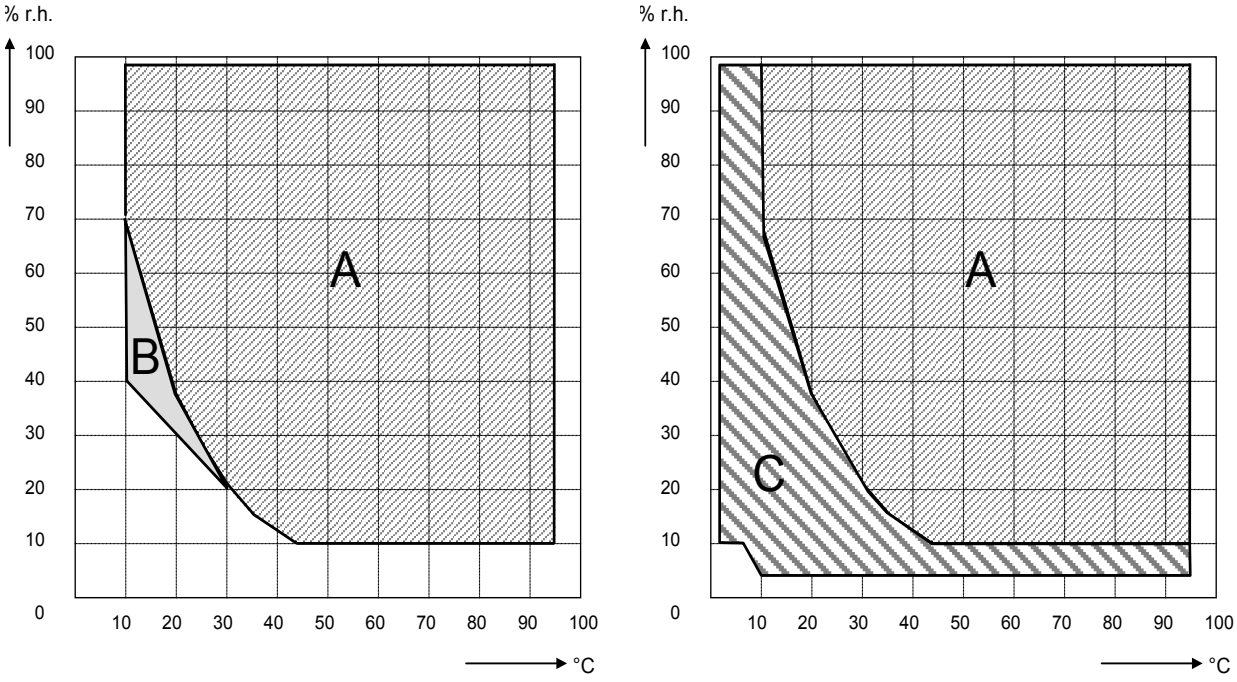
In case the “RESET” button does not cancel the notification or alarm indication, the reason for the disturbance was not removed correctly.

➢ Contact BINDER service.

14. Humidity system

The humidity system is turned on with the humidity switch (4) located in the lateral control panel.

The chamber is equipped with a capacitive humidity sensor. This results in a regulatory accuracy of up to ± 2.5 % r.h. of the set point. The temperature-humidity diagrams (Figure 19) show the possible working range for humidity.



Regular chambers

Chambers with optional compressed air dryer

Figure 19: Temperature-humidity diagrams MKF / MKFT

Range A: Control range of temperature and relative humidity.

Range B: Discontinuous range (no continuous operation, observe hints on defrosting, chap. 15)

Range C: Enlarged climatic range with optional compressed air dryer.

	In climatic operation (with humidity) the preset temperature and humidity values must be situated within range A in order to achieve optimum regulation. In the short-term set points in the discontinuous range (range B) can also be targeted. On the edges of the control range (ranges A + B) the regulatory accuracies of ± 2.5 % r.H. cannot be guaranteed.

	With temperature and humidity set-points outside ranges A and B, humidification control is automatically turned off. Humidity keeps being measured by the sensor and displayed, but may deviate in case of condensation.

	Entry of the humidity set-point 0 % r.h. in defined program sections permits completely turning off humidity in Program Mode and thus attaining faster temperature changes.

The chamber is equipped with a door heating system to prevent condensation in the door area.

CAUTION

Condensation by excess humidity.

Danger of corrosion on the housing after operating at humidity values > 70 % r.h. for a long period.

➢ Dry the appliance completely before shut-down:

- Set the humidity to 0 % r.h. or turn off the humidifying system at humidity switch (4).
- Set the temperature set point to 60 °C / *140°F* (Manual mode). Let the chamber operate for approx. 2 hours with closed door. Remove the access port plugs.
- Only then, shut down the chamber at the main power switch (3) and close the water supply tap.

Having turned off the chamber by the main power switch (3), always close the water supply tap.

If you operate the chamber at high humidity and then immediately turn off the chamber, the internal wastewater collector may overflow due to the condensate. This may lead to the emergence of water at the chamber.

CAUTION

Overflow of the internal wastewater tank due to condensate.

Emergence of water at the chamber.

∅ Following high humidity operation, do NOT directly turn off the chamber.

➢ Pump off the condensate before shut-down:

- Set the humidity to 0 % r.h. and turn on humidity switch (4). Operate the chamber for at least 2 hours.
- Only then, shut down the chamber at the main power switch (3) and close the water supply tap.

14.1 Function of the humidifying and dehumidifying system

Humidifying system

The humidifying system is located in the humidity generation module. In a cylindrical container with a volume of approx. 2 liters an electrical resistance heating evaporates water. The water content is kept exactly at 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. Condensation forming on the outer walls of the useable volume is led through a water drain in the outer chamber into the wastewater can which is pumped off automatically to the wastewater pipe when required.

Freshwater

You can supply the chamber with freshwater via a water pipe or by manually filling the internal freshwater can. It is not necessary to switch between both possibilities. When connecting to a water pipe, the water can automatically fills up. The can is located behind the right door of the humidity generation module.

	In order to ensure accurate humidifying, observe the following points with regard to the freshwater supply: • Supply pressure 1 to 10 bar when connecting to a water pipe • Water type: deionized (demineralized) water. • To ensure humidification during 24 hours even at high humidity set-points with manual water supply, we recommend filling the freshwater can 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 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.

Automatic fresh water supply via water pipe

With this type of supply, the humidity system is continuously functional. The correct water supply can be monitored at the internal water can, where the water is intermediately stored also if a water pipe is connected. The correct filling level is automatically maintained at ½ to ¾ of the maximum level.

Manual fresh water supply via internal freshwater can

With this type of supply, the humidity system is functional only if the water can is sufficiently filled. Check the filling level daily. The water reserve in the water can is sufficient for for a period, which may last between one and several days, depending on the humidity demand (entered humidity set-point and number of door openings). Fill the can up to the maximum level mark only. The cover of the water inlet valve must be screwed on the freshwater connection “IN” (18) (chap. 4.2.2).

Wastewater

The condensation water from the interior and excess freshwater (by manual excess filling or in case of fault) is collected in an internal can with a volume of approx. 1.5 liters. It is pumped off via the wastewater pipe.

Dehumidifying system

When switch Humidity ON / OFF (4) (located on the lateral control panel) is in position ON, the chamber dehumidifies as needed in order to reach the entered humidity set-point inside the Control range of temperature and relative humidity (Figure 19).

Dehumidification occurs in case of need by means of a defined dew point undershoot of several evaporators of the refrigeration system. The condensate which forms is carried away as wastewater.

With temperature set-points outside the control range (hatched area in Figure 19), humidification and dehumidification are automatically turned off. If the humidity system is turned off while there are descending temperature curves, then operation of the refrigeration system may cause dehumidification of the charging material.

With humidity set-points outside the control range (hatched area in Figure 19), or with entry of set-point 0 % r.H., the humidification and dehumidification system is turned off even if the humidity switch is in position ON.

For error indications concerning water supply and humidity system, see chap.13.1 and 19

15. Defrosting at refrigerating operation

BINDER alternating climate chambers are very diffusion-proof. To ensure high temperature precision there is no automatic cyclic defrosting device. However, at very low temperatures, the moisture in the air can condense on the evaporator plates leading to icing.

	Always close the door properly.

Operation with temperature set-points above +5 °C / *41 °F* at an ambient temperature of 20 °C / *68 °F*:

The air defrosts the ice cover automatically. Defrosting is continually performed.

Operation with temperature set-points below +5 °C / *41 °F* or in the discontinuous range (chap. 14):

The evaporator can cover with ice. Defrost the chamber manually.

	With temperature set-points below +5 °C / *41 °F*, regularly defrost the chamber manually: • Set the humidity to 0 % r.H. and turn on the humidifying system at humidity switch (4). • Set the temperature to 60 °C / *140 °F* (Manual Mode). • Let the chamber operate for approx. 1 hour with the door closed.

	Too much ice on the evaporator is noticeable by reduced refrigerating performance.

When turning off the chamber following prolonged refrigerating below +5 °C / *41 °F*, there is danger of overflowing due to uncontrolled defrosting of icing on the evaporator.

	**CAUTION** **Uncontrolled defrosting of icing on the evaporator.** **Danger of overflowing.** After several days of refrigerating below +5 °C / *41 °F*: ∅ Do NOT directly turn off the chamber. ➢ Manually defrost the chamber (see description above). ➢ Then, shut down the chamber at the main power switch (3) and close the tap of the water supply.

16. Options

16.1 Communication software APT-COM™ 3 DataControlSystem (option)

The chamber is regularly equipped with an Ethernet interface (10a) that can connect the BINDER communication software APT-COM™ 3 DataControlSystem can be connected. The MAC Address is indicated next to the Ethernet interface. The actual temperature and humidity values are given at adjustable intervals. Programming can be performed graphically via PC. Up to 30 chambers with RS 422 interface can be cross-linked. For further information, please refer to the operating manual of the BINDER communication software APT-COM™.

16.2 Interface RS 422 (option)

With this option, the chamber is equipped with a serial interface RS 422 (10b) instead of the Ethernet interface (10a) that can connect the BINDER communication software APT-COM™ 3 DataControlSystem. The actual temperature and humidity values are given at adjustable intervals. For further information, please refer to the operating manual of the BINDER communication software APT-COM™.

Pin allocation of the RS 422 interface:

Pin 2:	RxD (+)
Pin 3:	TxD (+)
Pin 4:	RxD (-)
Pin 5:	TxD (-)
Pin 7:	Ground

16.3 Analog outputs for temperature and humidity (option)

With this option, the chamber is equipped with analogue outputs 4-20 mA for actual value and set-point value of temperature and of humidity. These outputs allow transmitting data to external data registration systems or devices.

The connection “analog outputs for temperature” is realized as a DIN socket (13) in the lateral control panel as follows:

ANALOG OUTPUT TEMPERATURE 4-20 mA DC

PIN 1: Temperature actual value –
PIN 2: Temperature actual value +
PIN 4: Temperature set-point value –
PIN 5: Temperature set-point value +

MKF: Temperature range: -40 °C / *-40°F* up to +180 °C / *-356°F*
MKFT: Temperature range: -70 °C / *-94°F* up to +180 °C / *-356°F*

A suitable DIN plug is enclosed.

Figure 20: Pin allocation of DIN socket (13) for option analog outputs for temperature

The connection “analog outputs for humidity” is carried out as a DIN socket (14) in the lateral control panel as following:

ANALOG OUTPUT HUMIDITY 4-20 mA DC

PIN 1: Humidity actual value –
PIN 2: Humidity actual value +
PIN 4: Humidity set-point value –
PIN 5: Humidity set-point value +

Humidity range: 0 % r.H. up to 100 % r.H.

A suitable DIN plug is enclosed.

Figure 21: Pin allocation of DIN socket (14) for option analog outputs for humidity

16.4 Data logger kits

BINDER Data Logger Kits offer an independent long-term measuring system for temperature and humidity, available for different temperature ranges. According to the selected kit, the Data Logger can measure and record also the ambient temperature and humidity values via a second multi-function sensor.

BINDER Data Loggers are equipped with a keyboard and a large LCD display, alarm functions and a real-time function. Measurement data are recorded in the Data Logger and can be read out after the measurement via the RS232 interface of the Data Logger. It offers a programmable measuring interval and permits storing up to 64000 measuring values. Reading out is done with the Data Logger evaluation software. You can give out a combined alarm and status protocol directly to a serial printer.

Data Logger Kit T 220: Sensor for chamber temperature: Temperature range -90 °C / *-130 °F* up to +220 °C / *428 °F* .

Data Logger Kit TH 100: Multi-function sensor for chamber temperature and humidity: Temperature range -40 °C / *-40 °F* up to +100 °C / *212 °F* , humidity range 0% r.H. up to 100% r.H.

Data Logger Kit TH 100/70: Multi-function sensor for chamber temperature and humidity: Temperature range -40 °C / *-40 °F* up to +100 °C / *212 °F,* humidity range 0% r.H. up to 100% r.H. Multi-function sensor for ambient temperature and humidity: Temperature range -40 °C / *-40 °F* up to 70 °C / *158 °F,* humidity range 0% r.H. up to 100% r.H.

For detailed information on installation and operation of the BINDER Data Logger, please refer to the mounting instructions Art. No. 7001-0204 and to the original user manual of the manufacturer, supplied with the data logger.

16.5 Keyboard locking (option)

The keyboard of the MB1 controller can be locked and unlocked via the key switch (6) in the lateral control panel. In the locked position, no entries to the controller are possible.

- Locked keyboard: Switch position vertical
- Unlocked keyboard: Switch position to the right

You can remove the key only when the keyboard is locked.

If the keyboard is locked, the notification “KEY LOCK” is displayed on the controller MB1 display (chap. 13).

16.6 BINDER Pure Aqua Service (option)

The optional BINDER water treatment system (disposable system) serves to treat tap water. The lifetime depends on water quality and the amount of treated water. 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 Art. No. 7001-0159, delivered with BINDER Pure Aqua Service.

16.7 Compressed air dryer (option)

This option permits stronger dehumidification and thus the chamber can obtain lower humidity values, see modified temperature-humidity diagram (Figure 19). The compressed air dryer activates via the switch (8) in the lateral control panel. Then operation line 8 “AIR DRYER” of the controller serves to control (release) the compressed air dryer. 1 = turned on 2 = turned off.

The MKF 720 is particularly suitable for compliance with the common automotive standards

Compressed air connection: 6 to 8 bar domestic connection

We recommend an annual maintenance interval

The status display on the rear panel should be checked about once per month

	Normal operating state
	Maintenance due
	Contact BINDER Service

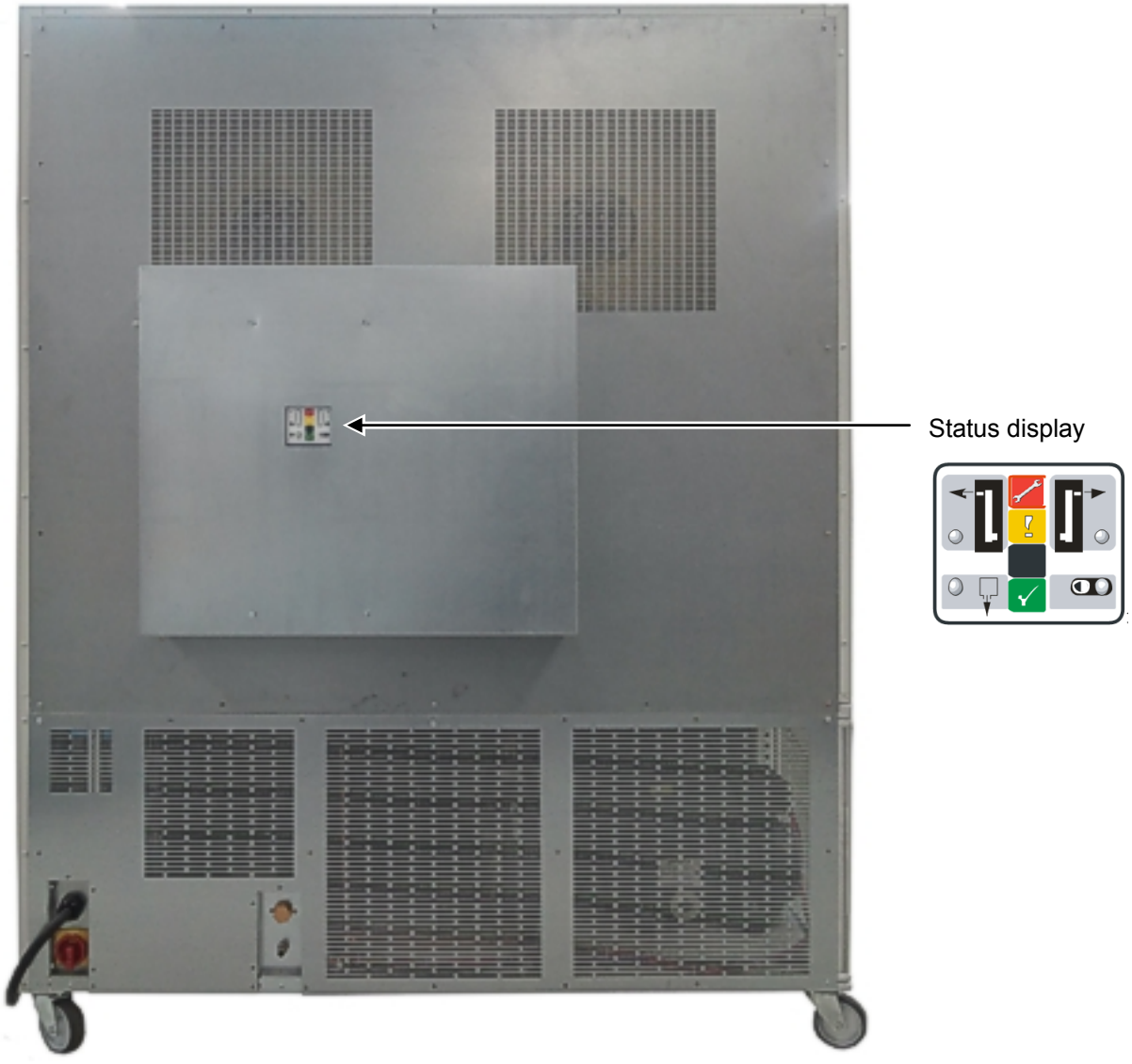


Figure 22: Rear view MKF 720 with optional compressed air dryer

16.8 Water cooling (option)

MKF / MKFT 115 und 240: The water cooling is turned on via the switch (7) in the lateral control panel. It reduces the heat, which is emitted during cooling operation to the ambient air and increases the cooling performance of the chamber (air cooling).

MKF / MKFT 720: The optional water cooling serves to cooling the chamber instead of the air cooling and reduces the heat, which is emitted to the ambient air during cooling operation.

Retrofitting by the manufacturer is possible: The chamber must be returned to the BINDER factory for installation.

You can supply the chamber's humidity system with freshwater and drain the wastewater via a water pipe or manually with the internal water cans, like with the regular chamber. With the optional water cooling, the chamber is equipped with two additional connections for the inlet and outlet of the cooling water.

Water connections

With the optional water cooling the chamber is supplied with cooling water via a freshwater pipe (max. inlet temperature: 10 °C / *50 °F*).

- Connection of cooling water inlet: please refer to chap. 4.3.
- Connection of cooling water outlet: please refer to chap. 4.4.

16.9 Additional measuring channel for digital object temperature indicator with flexible temperature sensor Pt 100 (option)

The object temperature display enables the determination of the actual temperature of the charging material during the whole process. The object temperature is measured via a flexible Pt100 temperature sensor and can be viewed at the display controller MB1. The sensor top protective tube of the flexible Pt 100 can be immersed into liquid substances.

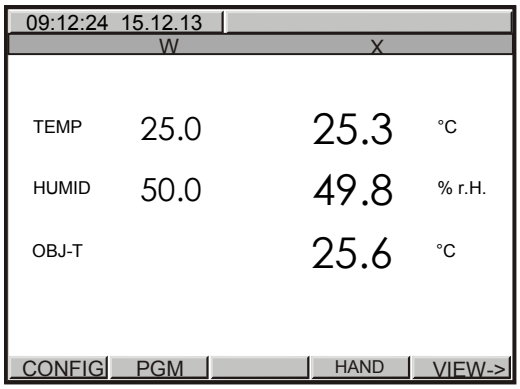


Figure 23: Display controller MB1 with object temperature display

The object temperature data are put out together with the data of the temperature controller to the Ethernet interface as second measuring channel and can be documented by the communication software APT-COM™ (option, chap. 16.1) developed by BINDER.

Technical data of the Pt 100 sensor:

- Three-wire technique
- Class B (DIN EN 60751)
- Temperature range up to 320 °C */ 608°F*
- Stainless steel protective tube 45 mm length, material no. 1.4501

17. Maintenance, cleaning, and service

17.1 Maintenance intervals, service

DANGER

Electrical hazard.

Danger of death.

∅ The chamber must NOT become wet during operation or maintenance works.

∅ Do NOT remove the rear panel of the chamber.

➢ Disconnect the chamber before conducting maintenance work. Disconnect the power plug.

➢ General maintenance work must be conducted by licensed electricians or experts authorized by BINDER.

➢ Maintenance work at the refrigeration system must only be conducted by qualified personnel who underwent training in accordance with EN 13313:2010 (e.g. a refrigeration technician with certified expert knowledge acc. to regulation 303/2008/EC). Follow the national statutory regulations.

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

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

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.

We recommend cleaning the condensers every 1 to 2 years. A qualified technician must perform cleaning.

Replace the door gasket only when cold. Otherwise, the door gasket may become damaged.

With an increased amount of dust in the ambient air, clean the condenser fan several times a year. We recommend checking the fan grid (behind the left maintenance access flap) every week. In case of visible dirt accumulation, disconnect the chamber and clean the fan grid by suction.

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 e-mail hotline:	service@binder-world.com
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 service hotline Russia and CIS	+7 495 988 15 16
BINDER Internet website	http://www.binder-world.com
BINDER address	BINDER GmbH, post office box 102, D-78502 Tuttlingen

International customers, please contact your local BINDER distributor.

17.2 Cleaning and decontamination

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

DANGER

Electrical hazard.

Danger of death.

∅ Do NOT spill water or cleaning agents over the inner and outer surfaces.

➢ Before cleaning, turn off the chamber at the main power switch and disconnect the power plug.

➢ Completely dry the chamber before turning it on again.

17.2.1 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 test material.

Wipe the surfaces with a moistened towel. In addition, you can use the following cleaning agents:

Exterior surfaces inner chamber racks door gaskets	Standard commercial cleaning detergents free from acid or halides. Alcohol based solutions. We recommend using the neutral cleaning agent Art. No. 1002-0016.
Instrument panel	Standard commercial cleaning detergents free from acid or halides. We recommend using 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. Art. Nr. 1002-0016 for a 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.

CAUTION

Danger of corrosion.

Damage to the chamber.

∅ Do NOT use acidic or chlorine cleaning detergents.

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

For surface protection, perform cleaning as quickly as possible.

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

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

	With every cleaning 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. Suitable protective gloves with full contact: butyl or nitrile rubber, penetration time >480 min.

	**CAUTION** **Contact with skin, ingestion.** **Skin and eye damage due to chemical burns.** ∅ Do not ingest. Keep away from food and beverages. ∅ Do NOT empty into drains. ➢ Wear protective gloves and goggles. ➢ Avoid skin contact.

17.2.2 Decontamination

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. Pull 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.

	For chemical disinfection, we recommend 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:

(1) 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.

(2) 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.

	**VORSICHT** **Eye contact.** **Eye damage due to chemical burns.** ∅ Do NOT empty into drains. ➢ Wear protective goggles.

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

17.3 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 that has previously been issued to you. An **authorization number** (RMA 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. 23) 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

18. Disposal

18.1 Disposal of the transport packing

Packing element	Material	Disposal
Straps to fix packing on pallet (size 115)	Plastic	Plastic recycling
Wooden transport box (size 720, option for size 115, 240) with metal screws	Non-wood (compressed matchwood, IPPC standard)	Wood recycling
	Metal	Metal recycling
Pallet with foamed plastic stuffing	Solid wood (IPPC standard)	Wood recycling
	PE foam	Plastic recycling
Transport box (size 115, 240) with metal clamps	Cardboard	Paper recycling
	Metal	Metal recycling
Top cover	Cardboard	Paper recycling
Edge protection	Styropor® or PE foam	Plastic recycling
Protection of doors and racks	PE foam	Plastic recycling
Upholstered transport piece (L-type profile) for door support	Steel or aluminum with plastic	Keep it for transportation purpose. Disposal: Metal recycling
Bag for operating manual	PE foil	Plastic recycling
Insulating air cushion foil (packing of optional accessories)	PE foil	Plastic recycling

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

18.2 Decommissioning

Turn off the main power switch (3) and the humidity switch (4). Turn off the rear power switch (20). Disconnect the chamber from the power supply. Remove the water installation.

	After turning off the chamber by the main power switch (3), always close the tap used for the water supply.

- Temporal decommissioning: See indications for appropriate storage, chap. 3.3.

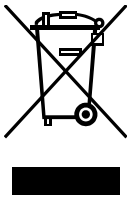
  In case of a prolonged temporal decommissioning: Leave the chamber door open or remove the access port plugs. For several weeks out of service, we recommend turning on the chamber every 3 days and operating it about 30 minutes in the cooling mode. This will ensure a quicker restart.

- Final decommissioning: Dispose of the chamber as described in chap. 18.3 to 18.5.

18.3 Disposal of the chamber in the Federal Republic of Germany

According to directive 2002/96/EC 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 chamber bears 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 2002/96/EC 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 with solid bar under. 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 device disposed of according to the German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG) from 23 March 2005, BGBl. I p. 762 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 23 March 2005, BGBl. I p. 762.

CAUTION

Violation against existing 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 the German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG) from 23 March 2005, BGBl. I p. 762.

or

➢ Instruct BINDER service to dispose of the device. The general terms of payment and delivery of the BINDER GmbH apply, which were valid at the time of purchasing the chamber.

Certified companies disassemble waste BINDER equipment in primary substances for recycling according to directive 2002/96/EC. 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. 23) and enclose it with the chamber.

WARNING

Contamination of the device with toxic, infectious or radioactive substances.

Danger of intoxication.

Danger of infection.

∅ NEVER take a chamber contaminated with toxic substances or sources of infection for recycling according to directive 2002/96/EC.

➢ Prior to disposal, remove all toxic substances and sources of infection from the chamber.

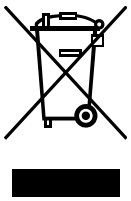
➢ Dispose of a chamber from which all toxic substances or sources of infection cannot be safely removed as special waste according to national law.

The refrigerants used 404a and R 23 (MKFT only) are not inflammable at ambient pressure. They must not escape into the environment. In Europe, recovery of the refrigerants R404a (GWP 3750) and R23 (GWP 12100) is mandatory according to regulation No. 842/2006/EC. Ensure the compliance with the applicable legal requirements regarding qualification of staff, disposal, and documentation.

18.4 Disposal of the chamber in the member states of the EC except for the Federal Republic of Germany

According to directive 2002/96/EC 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 chamber bears 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 2002/96/EC on waste electrical and electronic equipment (WEEE). WEEE marking: crossed-out wheeled bin with solid bar under.



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 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE).

CAUTION

Violation against existing 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 2002/96/EC 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 BINDER equipment in primary substances for recycling according to directive 2002/96/EC. 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. 23) and enclose it with the chamber.

WARNING

Contamination of the device with toxic, infectious or radioactive substances.

Danger of intoxication.

Danger of infection.

∅ NEVER take a chamber contaminated with toxic substances or sources of infection for recycling according to directive 2002/96/EC.

➢ Prior to disposal, remove all toxic substances and sources of infection from the chamber.

➢ Dispose of a chamber from which all toxic substances or sources of infection cannot be safely removed as “special” waste according to national law.

The refrigerants used 404a and R 23 (MKFT only) are not inflammable at ambient pressure. They must not escape into the environment. In Europe, recovery of the refrigerants R404a (GWP 3750) and R23 (GWP 12100) is mandatory according to regulation No. 842/2006/EC. Ensure the compliance with the applicable legal requirements regarding qualification of staff, disposal, and documentation.

18.5 Disposal of the chamber in non-member states of the EC

CAUTION

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. Please dispose of it according to national regulations.

The refrigerants used 404a and R 23 (MKFT only) are not inflammable at ambient pressure. They must not escape into the environment. In Europe, recovery of the refrigerants R404a (GWP 3750) and R23 (GWP 12100) is mandatory according to regulation No. 842/2006/EC. Ensure the compliance with the applicable legal requirements regarding qualification of staff, disposal, and documentation.

19. Troubleshooting

Fault description	Possible cause	Required measures
Heating		
Chamber without function. Turning on the main power switch (3) has no effect	Rear power switch (20) not turned on.	Turn on the rear power switch (20) at least one hour before operating the chamber.
Chamber heating permanently, set-point not maintained.	Semiconductor relay defective.	Contact BINDER service.
	Pt 100 sensor defective	
	Controller defective.	
	Controller not adjusted.	Calibrate and adjust controller.
Chamber doesn't heat up.	Heating element defective.	Contact BINDER service.
	Semiconductor relay defective	
Chamber doesn't heat up when turned on. Safety controller responds.	Limit temperature reached. Safety controller (chap. 12.2) set too low.	Let the chamber cool down and press the RESET button of the MB1 controller. If appropriate, select suitable limit value.
	Safety controller (chap. 12.2) defective.	Contact BINDER service.
Chamber permanently turned off.	Nominal temperature exceeded by 20 °C due to chamber failure. Over temperature protective device (class 1) responds.	Contact BINDER service.
Safety device class 2 responds.	Limit temperature reached.	Disconnect the chamber from the power supply and let it cool down. Detect the cause and remove it. Press the "RESET" button at the controller. Start up the chamber and check control functions. If appropriate, select suitable limit value.
Over-/under temperature safety device class 2 (option) responds.	Limit temperature reached.	Disconnect the chamber from the power supply and let it cool down. Detect cause and remove it. Press button "RESET CL 2.0" (5). Start up the chamber and check control functions. If appropriate, select suitable limit value.
Refrigerating performance		
No or low refrigerating performance.	Ambient temperature > 25 °C / 77°F (chap.3.4).	Select cooler place of installation.
	Combination of temperature/humidity values not in the optimum range (see temperature humidity diagram, Figure 19).	Select combination of temperature/humidity values in the optimum range (chap. 14).
	Compressor not turned on.	Contact BINDER service.
	Electro-valves defective.	
	No or not enough refrigerant.	
No refrigerating performance; notification "1H PREHEAT PHASE" in the controller display.	Rear power switch (20) turned on less than 1 hour before operating the chamber.	Turn on the rear power switch (20) at least one hour before operating the chamber.

Fault description	Possible cause	Required measures
Condensation		
Condensation at the samples.	Heating-up phase without bedew protection.	Use the bedew protection (chap. 10).
	Heating up very fast.	Select lower heating up speed (ramp).
Condensation or icing at the sides of the inner chamber.	Set-point for a long time below ambient temperature, icing in the preheating chamber.	Defrost the chamber.
Condensation at the samples or at the sides of the inner chamber; notification “1H PREHEAT PHASE” in the controller display.	Rear power switch (20) turned on less than 1 hour before operating the chamber.	Turn on the rear power switch (20) at least one hour before operating the chamber.
Humidity		
Humidity fluctuation: Control accuracy of ± 2.5 % 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.
No or low dehumidification.	Capillary tube blocked.	Contact BINDER service.
	Not enough refrigerant.	
No dehumidification; notification “1H PREHEAT PHASE” in the controller display.	Rear power switch (20) turned on less than 1 hour before operating the chamber.	Turn on the rear power switch (20) at least one hour before operating the chamber.
Icing at the sides of the inner chamber.	Set-point was too long below ambient temperature.	Defrost the chamber (chap. 15).
Condensation at the sides of the inner chamber.	Combination of temperature/humidity set-point values not in the optimum range (see temperature humidity diagram, Figure 19)	Select combination of temperature/humidity set-point values in the optimum range (chap. 14).
	Temperature set-point was too long below ambient temperature, icing in the preheating chamber.	Defrost the chamber (chap. 15)
	Combination of temperature/humidity set-point values leads to falling below the dew point.	Select suitable combination of temperature/humidity set-point values.
Controller		
No chamber function (dark display).	Display mode “Standby” active.	Press any controller key.
	Main power switch turned off.	Turn on the main power switch.
No entries to controller keypad possible. Notification “KEY LOCK” is displayed	Keyboard locking (option) activated.	Unlock keyboard locking (chap. 16.5).
No access to menu “User settings”.	User code incorrect.	Contact BINDER service.
Wrong temperature alarms, disturbance of temperature accuracy	Temperature unit changed to °F.	Set temperature unit to °C (chap. 6.4).
Chart recorder function: measured-value memory cleared, information lost.	New setting of storage rate.	Change the storage rate ONLY if the previously registered data are no longer required (chap. 7).

Fault description	Possible cause	Required measures
Controller (continued)		
Controller does not attain set-points entered in Manual Mode.	Button EXIT or AUTOMATIC has been pressed: Chamber is in Idle Mode.	Change to Manual Mode (chap. 8).
Controller does not attain program set-points.	Button EXIT or AUTOMATIC has been pressed: Chamber is in Idle Mode.	Start the program again (chap. 9.9).
Program duration longer than programmed.	Tolerances have been programmed.	For rapid transition phases, do NOT program tolerance limits in order to permit maximum heating, refrigerating, or humidification speed.
Program stops one section too early.	Program line is incomplete.	When programming, 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.	When using the Program Editor of the software APT-COM™ 3 DataControl-System, the setting “step” has been selected.	Select setting “ramp” in the Program Editor of the software APT-COM™ 3 DataControlSystem and transfer a program to the chamber controller.
Humidity alarm message when operating without humidity (humidity switch (4) OFF)	Humidity set-point set to a value > 0% r.H.	Manual Mode: Enter a humidity set-point 0% r.H. Program Mode: Enter a humidity subprogram with humidity set-point 0% r.H.
Display flashing: 1999 or -1999 or 9999.	Sensor rupture between sensor and controller or Pt 100 sensor defective.	Contact BINDER service.
	Short-circuit.	
	Initialization problem due to turning on the chamber too early.	Observe a delay time of approx. 30s between turning the chamber Off and On again the chamber.

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

20. Technical description

20.1 Factory calibration and adjustment

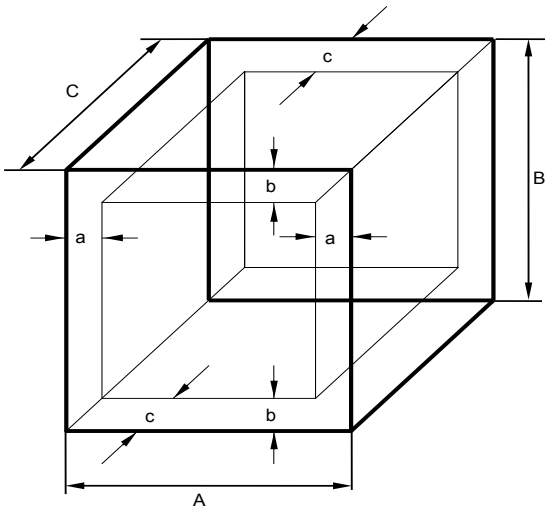
The chambers were calibrated and adjusted in the factory. Calibration and adjustment were performed using standardized test instructions, according to the QM DIN EN ISO 9001 system applied by BINDER (certified since December 1996 by TÜV CERT). All test equipment used is subject to the administration of measurement and test equipment that is also constituent part of the BINDER QM DIN EN ISO 9001systems. They are controlled and calibrated to a DKD-Standard at regular intervals.

20.2 Over current protection

The chambers are equipped with an internal protection not accessible from outside. If these fuses have responded, please contact an electronic engineer or BINDER service.

20.3 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 24: Determination of the useable 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 and humidity.

20.4 MKF (E3.2) technical data

Chamber size		**115**	**240**	**720**
Exterior dimensions				
Width (including 18 mm / *0.7 in* for 1 access port (MKF 115, 240), 36 mm / *1.4 in* for 2 access ports (MKF 720), with plug)	mm / *inch*	1000 / *39.37*	1135/ *44.69*	1615 / *63.58*
Height (incl. castors)	mm / *inch*	1725 / *67.91*	1715 / *67.52*	2005 / *78.94*
Depth (incl. cable and door handle)	mm / *inch*	915 / *36.02*	1000/ *39.37*	1230 / *48.43*
Depth (incl. cable and door handle) with optional compressed air dryer	mm / *inch*	1085 / *42.72*	1170 / *46.06*	1400 / *55.12*
Depth (incl. cable and door handle) with voltage and frequency changer	mm / *inch*	1530 / *60.24*	1615 / *36.58*	1845 / *72.64*
Wall clearance rear	mm / *inch*	300 / *11.81*	300 / *11.81*	300 / *11.81*
Wall clearance rear with optional compressed air dryer or to set up the voltage and frequency changer	mm / *inch*	1000 / 39.37	1000 / 39.37	1000 / 39.37
Wall clearance sides	mm / *inch*	200 / *7.87*	200 / *7.87*	200 / *7.87*
Window width	mm / *inch*	288 / *11.34*	508 / *19.99*	508 / *19.99*
Window height	mm / *inch*	222 / *8.74*	300 / *11.81*	300 / *11.81*
Number of doors	pc.	1	1	1
Interior dimensions				
Width	mm / *inch*	600 / *23.62*	735 / *28.94*	1200 / *47.24*
Height	mm / *inch*	480 / *18.90*	700 / *27.56*	1020 / *40.16*
Depth	mm / *inch*	400 / *15.75*	443 / *17.44*	600 / *23.62*
Interior volume	l / *cu.ft.*	115 / *4.06*	228 / *8.05*	734 / *25.92*
Number of racks, standard / max.	pc.	1/4	1/6	1/11
Load per rack	kg / *lbs.*	30 / *66*	30 / *66*	40 / *88*
Permitted total load	kg / *lbs.*	60 / *132*	70 / *155*	160 / *353*
Temperature data (without humidity)				
Temperature range	°C / *°F*	-40 to +180 / *-40 to 356*		
Temperature fluctuation	± K	0.1 to 0.6	0.1 to 0.5	0.1 to 0.5
Temperature uniformity (variation)	± K	0.1 to 1.3	0.1 to 1.5	0.1 to 1.8
Average heating up time acc. to IEC 60068-3-5 *)	K/min.	5.5	5.0	4.8
Average cooling down time acc. to IEC 60068-3-5	K/min.	4.5	5.0	4.8
Max. heat compensation at 25 °C / 77 *°F*	W	2500	2800	6500
Climatic data (with humidity)				
Temperature range	°C / *°F*	+10 to +95 / *50 to 203*		
Temperature range with optional compressed air dryer	°C / *°F*	0 to +95 / *32 to 203*		
Temperature fluctuation	± K	0.1 to 1.3	0.1 to 1.3	0.2 to 1.5
Humidity range	% r.H.	10 to 98	10 to 98	10 to 98
Humidity range with optional compressed air dryer	% r.H.	5 to 98	5 to 98	5 to 98
Humidity fluctuation	± % r.H.	≤ 2.5	≤ 2.5	≤ 2.5
Dew point temperature range	°C / *°F*	+5 to +94 / *41 to 201*		
Dew point temperature range with optional compressed air dryer	°C / *°F*	-28 to +94 / *-18.4 to 201*		
Max. heat compensation at 25 °C / 77 *°F* and 90 % r.H. (without optional compressed air dryer)	W	400	400	1000

Chamber size		115	240	720
Electrical data				
IP-system of protection acc. to EN 60529	IP	20	20	20
Nominal voltage (+/-10%) at 50 Hz power frequency	V	400	400	400
Current type		3N~	3N~	3N~
Nominal power	kW	4.80	6.80	11.00
Energy consumption at +25 °C / *77 °F* and 60 % r.H.	Wh/h	1250	1500	3900
Power plug: CEE plug 5-poles	Amp	16	16	32
Over-voltage category acc. to IEC 61010-1		II	II	II
Pollution degree acc. to IEC 61010-1		2	2	2
Over-current release category B, 3 x internal	Amp	16	16	25
Electrical data of the voltage and frequency changer				
IP-system of protection acc. to EN 60529	IP	23	23	23
Nominal voltage (+/-10%) 60 Hz (input side)	V	480 3N~	480 3N~	480 3N~
Nominal power	kW	9	9	13
Over-voltage category acc. to IEC 61010-1		II	II	II
Pollution degree acc. to IEC 61010-1		2	2	2
Fuse	A	16	16	25
Further information				
Weight (empty)	kg / *lbs.*	280 / *617*	360 / *794*	590 / *1300*
Weight (empty) with optional compressed air dryer	kg / *lbs.*	295 / *650*	375 / 827	605 / *1334*
Filling weight of refrigerant R 404A (GWP 3750)	kg / *lbs.*	2.00 / *4.41*	2.20 / *4.85*	5.00 / *11.02*
Noise level (mean value)	dB(A)	62	65	65
Noise level with optional compressed air dryer (short-term) (mean value)	dB(A)	85	85	85
Noise level with voltage and frequency changer (mean value)	dB(A)	67	67	67

*) Chambers with voltage and frequency changer: Values reduced by 0.3 K/min each.

All technical data is specified for unloaded chambers with standard equipment at an ambient temperature of +22 °C ± 3 °C / *71.6 °F ± 5.4 °F* and a power supply voltage fluctuation of +/-10%. Technical data is determined in accordance to BINDER Factory Standard Part 1:2015 following 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.

	If the chamber is fully loaded, the specified heating up and cooling down times may vary according to the load.

	Bringing a source of humidity into the inner chamber will affect the minimum humidity specification and may affect the humidity accuracy.

20.5 MKFT (E3.2) technical data

Chamber size		**115**	**240**	**720**
Exterior dimensions				
Width (including 18 mm / *0.7 in* for 1 access port (MKFT 115, 240), 36 mm / *1.4 in* for 2 access ports (MKFT 720), with plug)	mm / *inch*	1000 / *39.37*	1135 / *44.69*	1615 / *63.58*
Height (incl. castors)	mm / *inch*	1725 / *67.91*	1940 / *76.38*	2005 / *78.94*
Depth (incl. cable and door handle)	mm / *inch*	915 / *36.02*	1000/ *39.37*	1230 / *48.43*
Depth (incl. cable and door handle) with optional compressed air dryer	mm / *inch*	1085 / *42.72*	1170 / *46.06*	1400 / *55.12*
Depth (incl. cable and door handle) with voltage and frequency changer	mm / *inch*	1530 / *60.24*	1615 / *36.58*	1845 / *72.64*
Wall clearance rear	mm / *inch*	300 / *11.81*	300 / *11.81*	300 / *11.81*
Wall clearance rear with optional compressed air dryer or to set up the voltage and frequency changer	mm / *inch*	1000 / 39.37	1000 / 39.37	1000 / 39.37
Wall clearance sides	mm / *inch*	200 / *7.87*	200 / *7.87*	200 / *7.87*
Window width	mm / *inch*	288 / *11.34*	508 / *19.99*	508 / *19.99*
Window height	mm / *inch*	222 / *8.74*	300 / *11.81*	300 / *11.81*
Number of doors	pc.	1	1	1
Interior dimensions				
Width	mm / *inch*	600 / *23.62*	735 / *28.94*	1200 / *47.24*
Height	mm / *inch*	480 / *18.90*	700 / *27.56*	1020 / *40.16*
Depth	mm / *inch*	400 / *15.75*	443 / *17.44*	600 / *23.62*
Interior volume	l / *cu.ft.*	115 / *4.06*	228 / *8.05*	734 / *25.92*
Number of racks, standard / max.	pc.	1/4	1/6	1/11
Load per rack	kg / *lbs.*	30 / *66*	30 / *66*	40 / *88*
Permitted total load	kg / *lbs.*	60 / *132*	70 / *155*	160 / *353*
Temperature data (without humidity)				
Temperature range	°C / *°F*	-70 to +180 / *-94 to 356*		
Temperature fluctuation	± K	0.1 to 0.5	0.1 to 0.5	0.1 to 0.5
Temperature uniformity (variation)	± K	0.1 to 1.3	0.2 to 1.8	0.3 to 2.0
Average heating up time acc. to IEC 60068-3-5 *)	K/min.	5.5	5.0	4.8
Average cooling down time acc. to IEC 60068-3-5	K/min.	4.2	4.2	4.0
Max. heat compensation at 25 °C / *77°F*	W	1500	3000	5000
Climatic data (with humidity)				
Temperature range	°C / *°F*	+10 to +95 / 50 to 203		
Temperature range with optional compressed air dryer	°C / *°F*	0 to +95 / *32 to 203*		
Temperature fluctuation	± K	0.1 to 1.0	0.1 to 1.5	0.1 to 1.0
Humidity range	% r.H.	10 to 98	10 to 98	10 to 98
Humidity range with optional compressed air dryer	% r.H.	5 to 98	5 to 98	5 to 98
Humidity fluctuation	± % r.H.	≤ 2.5	≤ 2.5	≤ 2.5
Dew point temperature range	°C / *°F*	+5 to +94 / *41 to 201*		
Dew point temperature range with optional compressed air dryer	°C / *°F*	-28 to +94 / *-18.4 to 201*		
Max. heat compensation at 25 °C / *77°F* and 90 % r.H. (without optional compressed air dryer)	W	400	400	800

Chamber size		115	240	720
Electrical data				
IP-system of protection acc. to EN 60529	IP	20	20	20
Nominal voltage (+/-10%) at 50 Hz power frequency	V	400	400	400
Current type		3N~	3N~	3N~
Power frequency	Hz	50	50	50
Nominal Power	kW	6.20	7.50	13.00
Energy consumption at +25 °C / *77°F* and 60 % r.H.	Wh/h	1250	1500	2200
Power plug: CEE plug 5-poles	Amp	16	16	32
Over-voltage category acc. to IEC 61010-1		II	II	II
Pollution degree acc. to IEC 61010-1		2	2	2
Over-current release category B, 3 x internal	Amp	16	16	25
Electrical data of the voltage and frequency changer				
IP-system of protection acc. to EN 60529	IP	23	23	23
Nominal voltage (+/-10%) 60 Hz (input side)	V	480 3N~	480 3N~	480 3N~
Nominal power	kW	9	9	13
Over-voltage category acc. to IEC 61010-1		II	II	II
Pollution degree acc. to IEC 61010-1		2	2	2
Fuse	A	16	16	25
Further information				
Weight (empty)	kg / *lbs.*	330 / *728*	415 / *915*	635 / *1400*
Weight (empty) with optional compressed air dryer	kg / *lbs.*	345 / *761*	430 / *948*	650 / *1433*
Filling weight of refrigerant R 404A (1^{st} stage cooling, GWP 3750)	kg / *lbs.*	1.60 / *3.53*	2.20 / *4.85*	4.00 / *8.82*
Filling weight of refrigerant R23 (2^{nd} stage cooling, GWP 12100)	kg / *lbs.*	0.32 / *0.71*	0.40 / *0.88*	0.87 / *1.92*
Noise level (mean value)	dB(A)	62	65	69
Noise level with optional compressed air dryer (short-term) (mean value)	dB(A)	85	85	85
Noise level with voltage and frequency changer (mean value)	dB(A)	67	67	67

*) Chambers with voltage and frequency changer: Values reduced by 0.3 K/min each.

All technical data is specified for unloaded chambers with standard equipment at an ambient temperature of +22 °C ± 3 °C / *71.6 °F ± 5.4 °F* and a power supply voltage fluctuation of +/-10%. Technical data is determined in accordance to BINDER Factory Standard Part 1:2015 following 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.

	If the chamber is fully loaded, the specified heating up and cooling down times may vary according to the load.

	Bringing a source of humidity into the inner chamber will affect the minimum humidity specification and may affect the humidity accuracy.

20.6 Equipment and Options MKF / MKFT

	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
Microprocessor display program controller with 2-channel technology for temperature and humidity
Electronically controlled humidifying and dehumidifying system with capacitive humidity sensor *) (humidity range, see diagram)
Integrated freshwater can
Heated window and interior lighting
Programmable bedew protection of charging material
Environmentally friendly refrigerant R404a (MKF / MKFT) and R 23 (MKFT)
Temperature safety device class 2 acc. to DIN 12880:2007
Internal socket 230 V AC 230V, 1N ~ 50-60 Hz, max. load 500W, protection type IP 54
4 zero-voltage relay outputs, addressable via operation lines
Ethernet interface for computer communication
1 access port with silicone plug ∅ 50 mm / *1.97 in* left (MKF / MKFT 115, 240), 2 access ports with silicone plug ∅ 80 mm / *3.15 in* left and right (MKF / MKFT 720)
Rack, stainless steel
Aeration / venting
Alarm message in case of lack of water inside the freshwater can
Four castors (2 lockable)

Options / accessories
Additional rack, stainless steel
Perforated rack, stainless steel
Reinforced rack with 1 set of rack lockings
Securing elements for additional fastening of racks (4 pieces)
Keyboard locking
Lockable door
Safety kit for water connection with hose burst protection device and reflux protection device, pre-mounted assembly (available via BINDER INDIVIDUAL customized solutions)
Access ports 30 mm, 50 mm, 80 mm, 100 mm, 125 mm, left or right, with silicone plug
Over-/under temperature safety device class 2
Analogue outputs 4-20 mA actual and set-point values for temperature and humidity with 6 pole DIN socket, DIN plug included
Additional measuring channel in the MB1 controller for digital specimen temperature display with flexible Pt100 temperature sensor
Communication interface RS422
BINDER Data Logger kit for temperature T 220 (chamber values), for temperature / humidity TH 100 (chamber values) or TH 100/70 (chamber and ambient values)
Controlled compressed air dryer
Controlled compressed air dryer particularly suitable for compliance with the common automotive standards (MKF 720)
Water cooling (MKF. For MKFT available via BINDER INDIVIDUAL customized solutions)
Notch-type access port 35 x 100 mm in the door
BINDER Pure Aqua Service
Exchange cartridge for BINDER Pure Aqua Service

Options / accessories (continued)
Water circle: condensate recycling
Calibration of temperature and humidity including certificate
Spatial temperature and humidity measurement including certificate
Spatial temperature measurement acc. to DIN 12880 and humidity measurement with 9 measuring points at 25 °C / 77°F and 60% r.H. or at specified values, with measuring protocol and certificate
Qualification folder

*) A water supply (1 to 10 bar) is necessary for the installation of the humidifying and de-humidifying system. If no suitable house water connection is available, you can manually supply water by filling a freshwater can. Furthermore, a water drain in a max. distance of 3 meters / *9.8 ft.* and a max. height of 1 meter / *3.3 ft.* is required.

If the refrigerating machine is continuously operated, the lifetime of the condenser-fan is 2.3 years.

20.7 Accessories and spare parts

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	**115**	**240**	**720**
Description	**Art. no.**		
Rack, stainless steel	6004-0008	6004-0097	6004-0102
Perforated rack, stainless steel	6004-0030	8009-0447	8009-0511
Reinforced rack, stainless steel, with rack lockings	8012-0709	8012-0605	8012-0684
Rack lockings (4 pieces)	8012-0620	8012-0620	8012-0620
Door gasket silicone inside	6005-0151	6005-0188	6005-0199
Door gasket silicone outside	6005-0152	6005-0157	6005-0173
Radial fan	5013-0088	5013-0089	5013-0089
Seal ring	6005-0224 6005-0225 6005-0226	6005-0221 6005-0222 6005-0223	6005-0221 6005-0222 6005-0223
Unit fuse (3 pieces internal), overload release B16A	5006-0069	5006-0069	--
Unit fuse (3 pieces internal), overload release B25A	--	--	5006-0072

Description	**Art. no.**
Thermal cut-off device 229 °C / *444 °F* class 1	5006-0037
Water connection kit	8009-0135
Safety kit for water connection with hose burst protection device and reflux protection device	BINDER INDIVIDUAL Customized Solutions
Program controller MB1, display	5014-0182
Program controller MB1, E/A board	5014-0117
Temperature sensor Pt 100 straight	5002-0021
MKFT: Temperature sensor 2xPt 100 straight	5002-0046
Humidity sensor	5002-0044
Data Logger Kit T 220	8012-0715
Data Logger Kit TH 100	8012-0718
Data Logger Kit TH 100/70	8012-0719

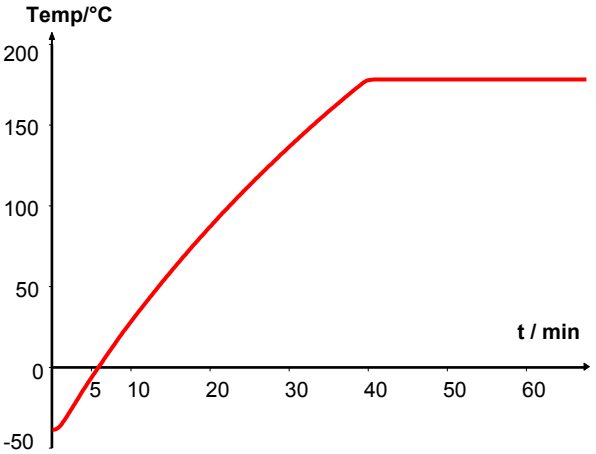
Description	Art. no.
BINDER Pure Aqua Service	8012-0759
Exchange cartridge for BINDER Pure Aqua Service	6011-0165
Door switch	5019-0009
Humidification module	8009-0791
Qualification folder MKF	8012-0865
Qualification folder MKFT	8012-0866
Neutral cleaning agent, 1 kg	1002-0016

MKF calibration service	Art. no.
Calibration of temperature and humidity including certificate MKF	DL013021
Spatial temperature and humidity measurement including certificate (2-5 measuring points temperature, 1 measuring point humidity) MKF	DL013022
Spatial temperature and humidity measurement including certificate (6-9 measuring points temperature, 1 measuring point humidity) MKF	DL013023
Spatial temperature and humidity measurement including certificate (10-18 measuring points temperature, 1 measuring point humidity) MKF	DL013024
Spatial temperature and humidity measurement including certificate (19-27 measuring points temperature, 1 measuring point humidity) MKF	DL013025
Spatial temperature and humidity measurement acc. to DIN 12880 including certificate (27 measuring points temperature, 9 measuring points humidity) MKF	DL013026

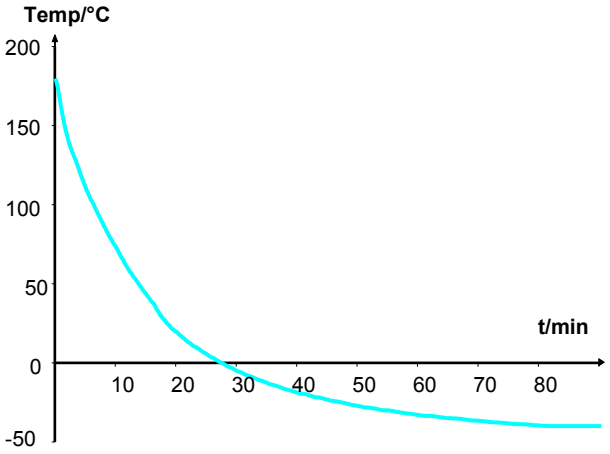
MKFT calibration service	Art. no.
Calibration of temperature and humidity including certificate MKFT	DL039021
Spatial temperature and humidity measurement including certificate (2-5 measuring points temperature, 1 measuring point humidity) MKFT	DL039022
Spatial temperature and humidity measurement including certificate (6-9 measuring points temperature, 1 measuring point humidity) MKFT	DL039023
Spatial temperature and humidity measurement including certificate (10-18 measuring points temperature, 1 measuring point humidity) MKFT	DL039024
Spatial temperature and humidity measurement including certificate (19-27 measuring points temperature, 1 measuring point humidity) MKFT	DL039025
Spatial temperature and humidity measurement acc. to DIN 12880 including certificate (27 measuring points temperature, 9 measuring points humidity) MKFT	DL039026

20.8 Heating-up and cooling-down graphs MKF

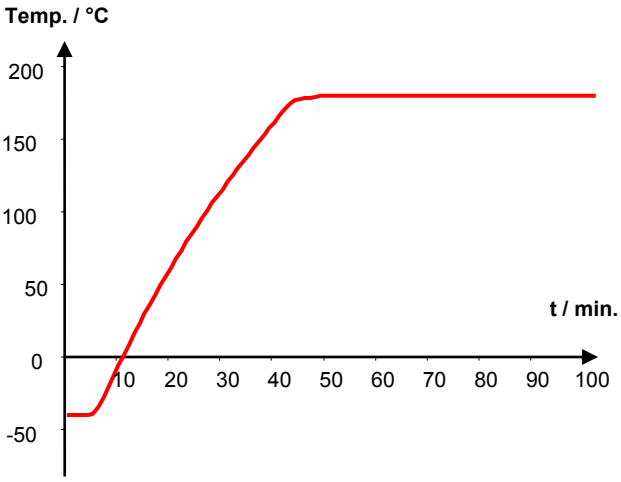
Heating-up graph MKF 115



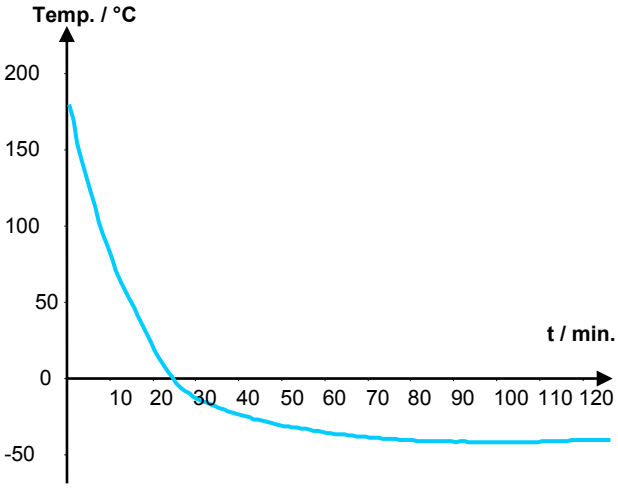
Cooling-down graph MKF 115



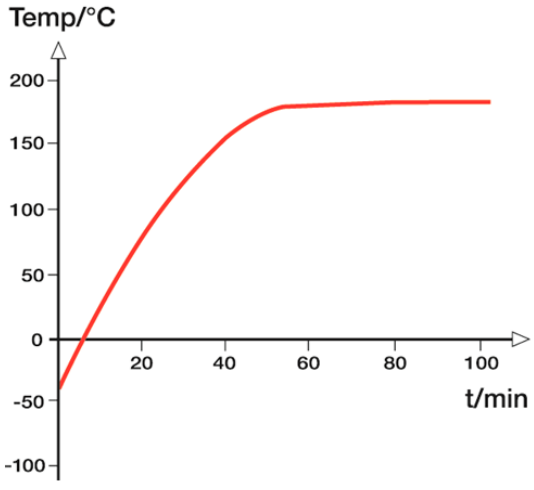
Heating-up graph MKF 240



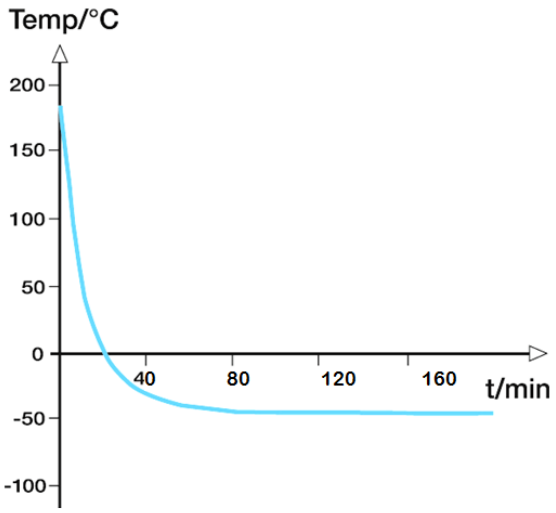
Cooling-down graph MKF 240



Heating-up graph MKF 720

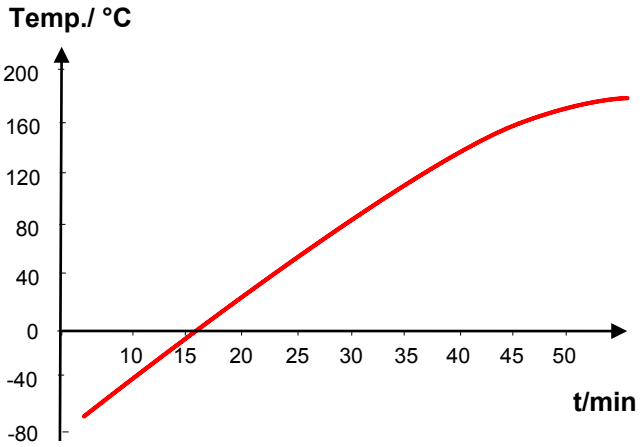


Cooling-down graph MKF 720

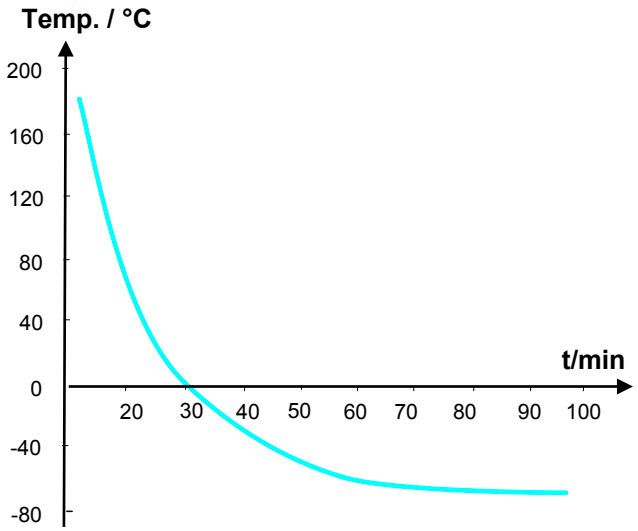


20.9 Heating-up and cooling-down graphs MKFT

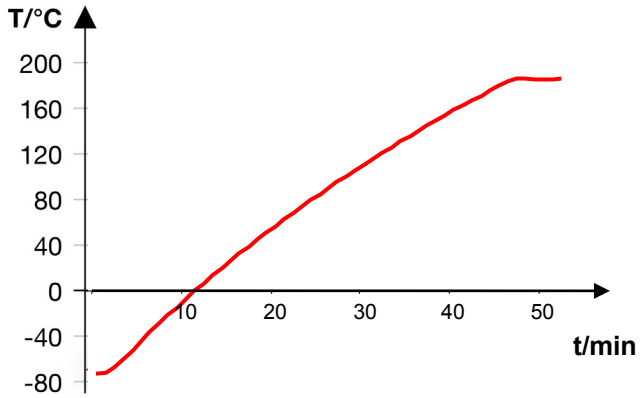
Heating-up graph MKFT 115



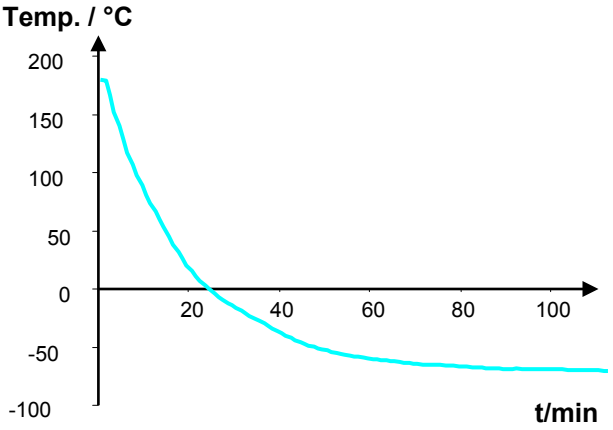
Cooling-down graph MKFT 115



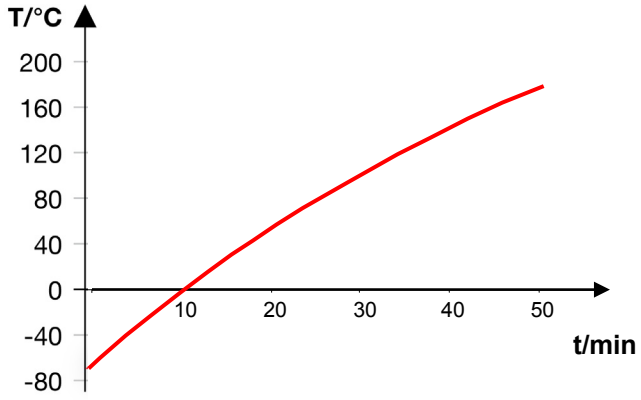
Heating-up graph MKFT 240



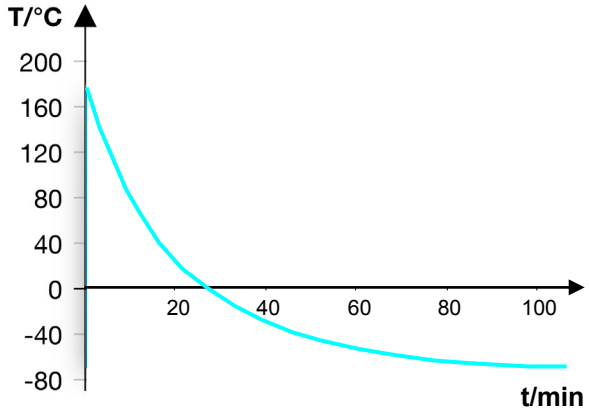
Cooling-down graph MKFT 240



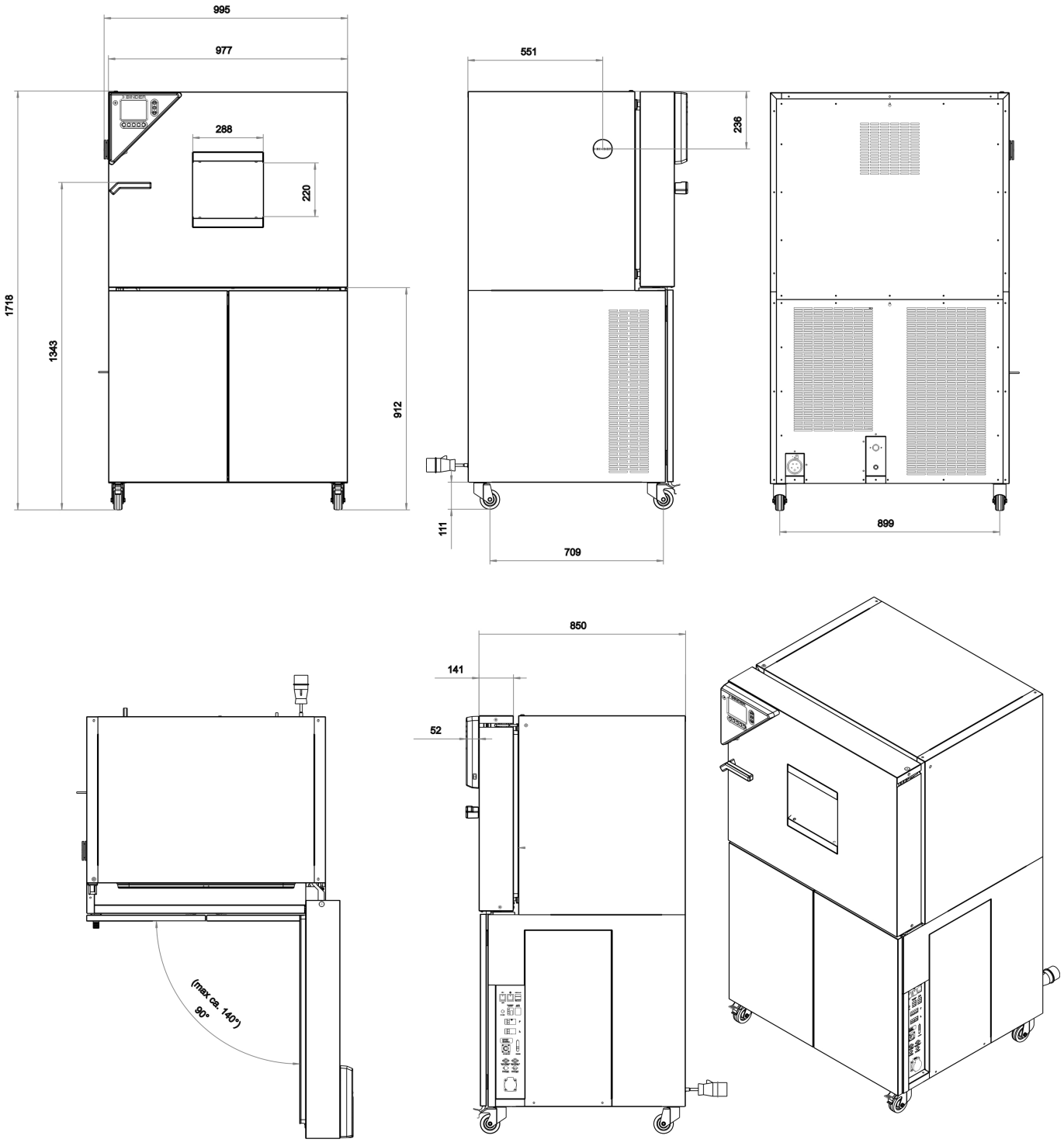
Heating-up graph MKFT 720



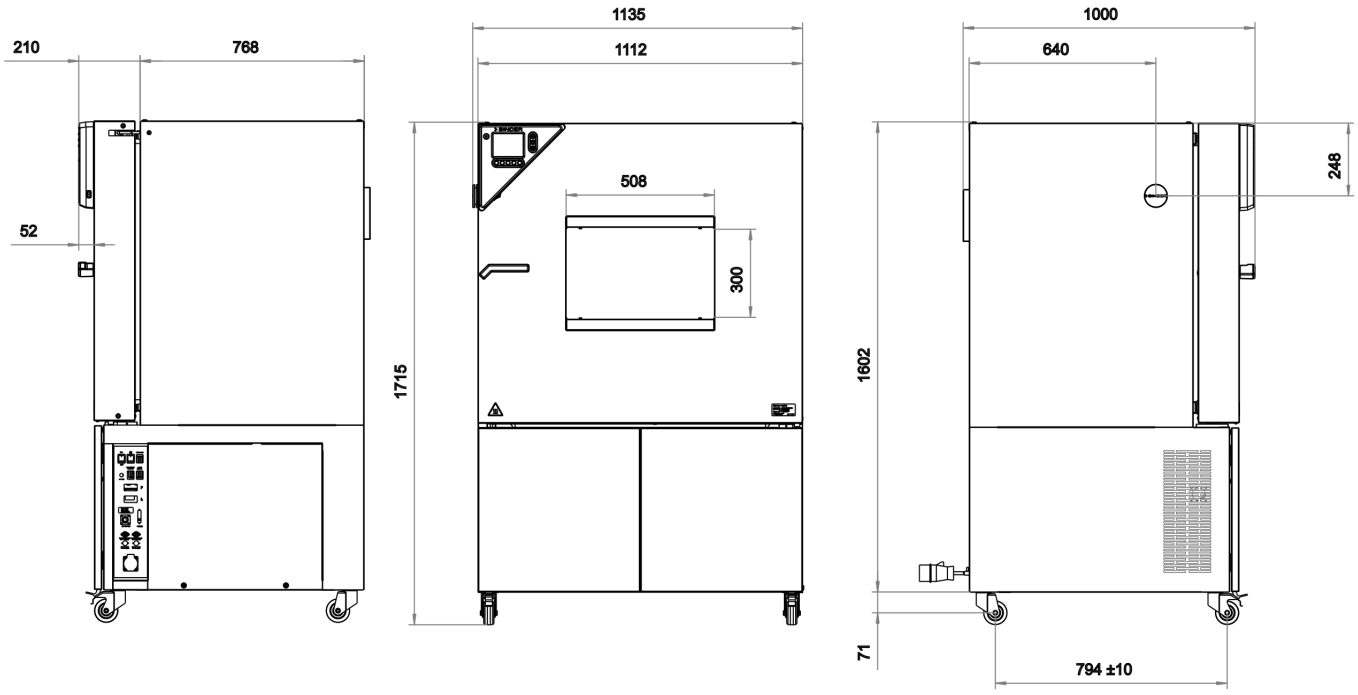
Cooling-down graph MKFT 720

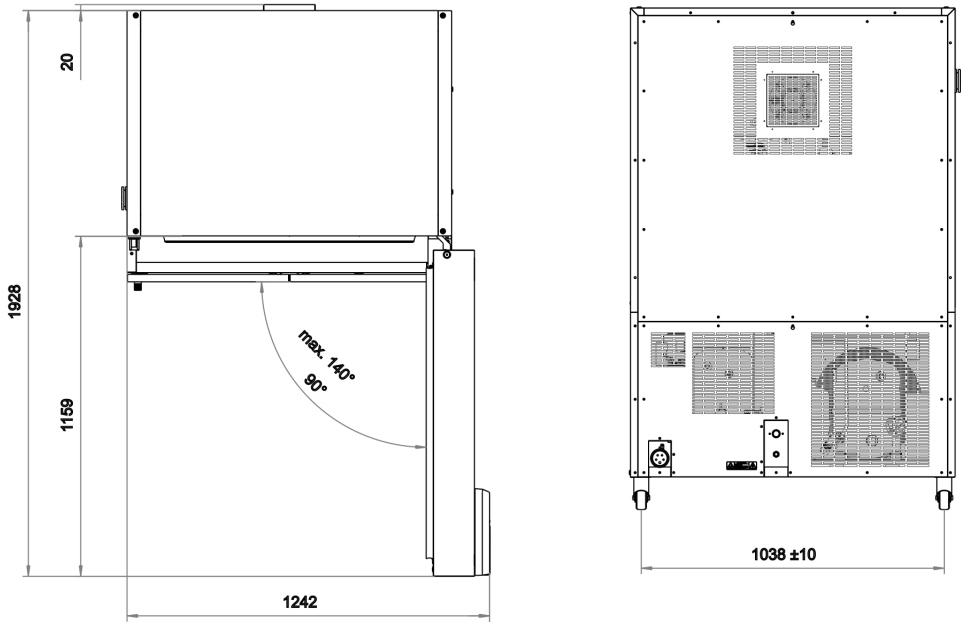


20.10 Dimensions MKF 115 / MKFT 115

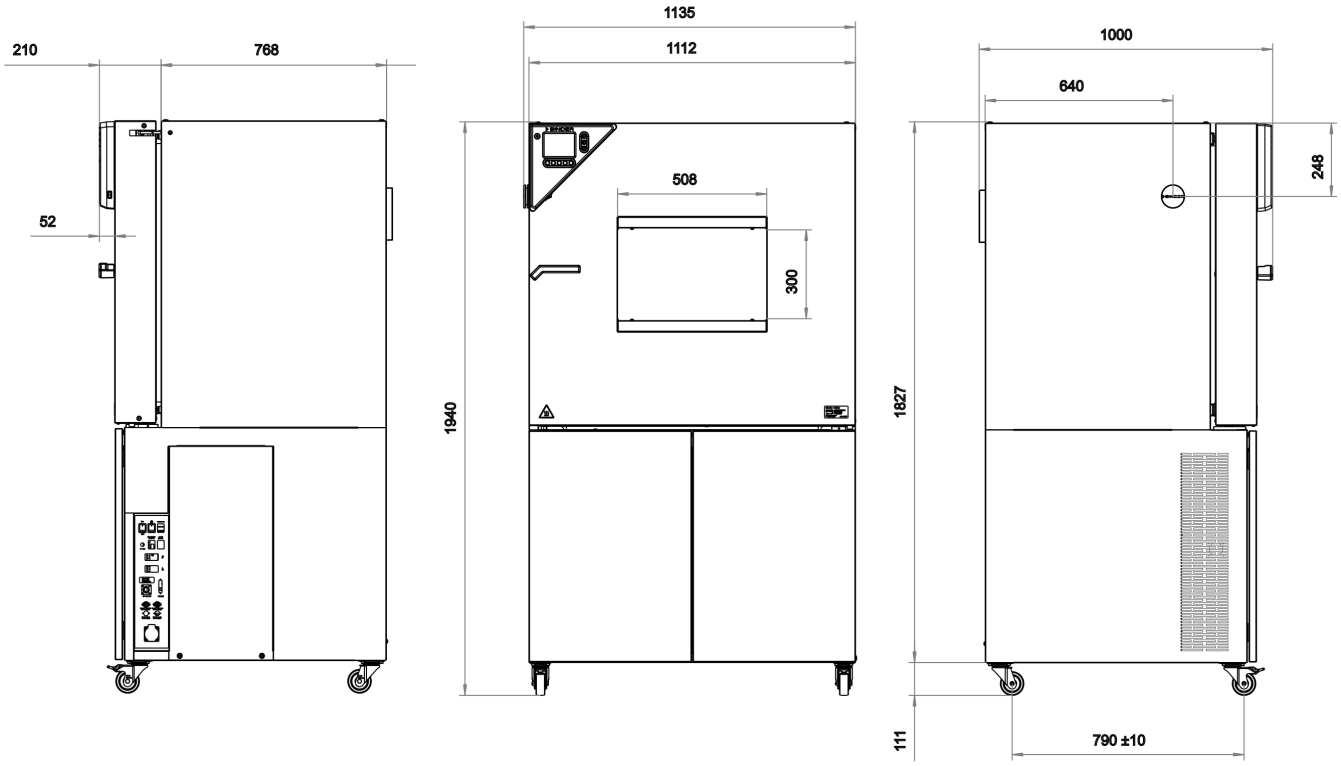


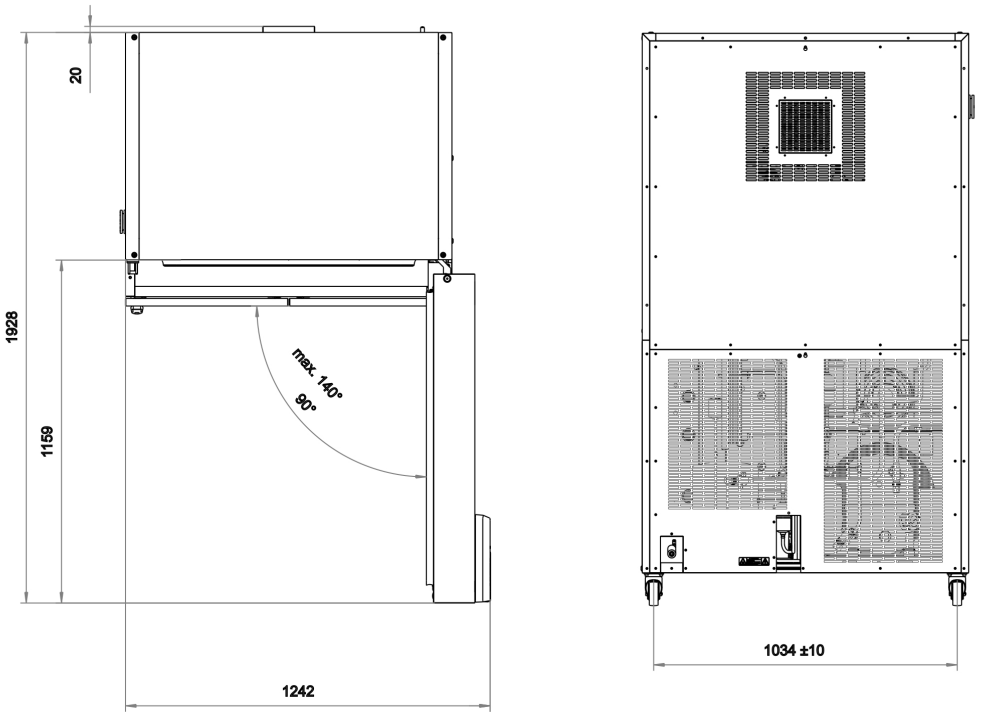
20.11 Dimensions MKF 240



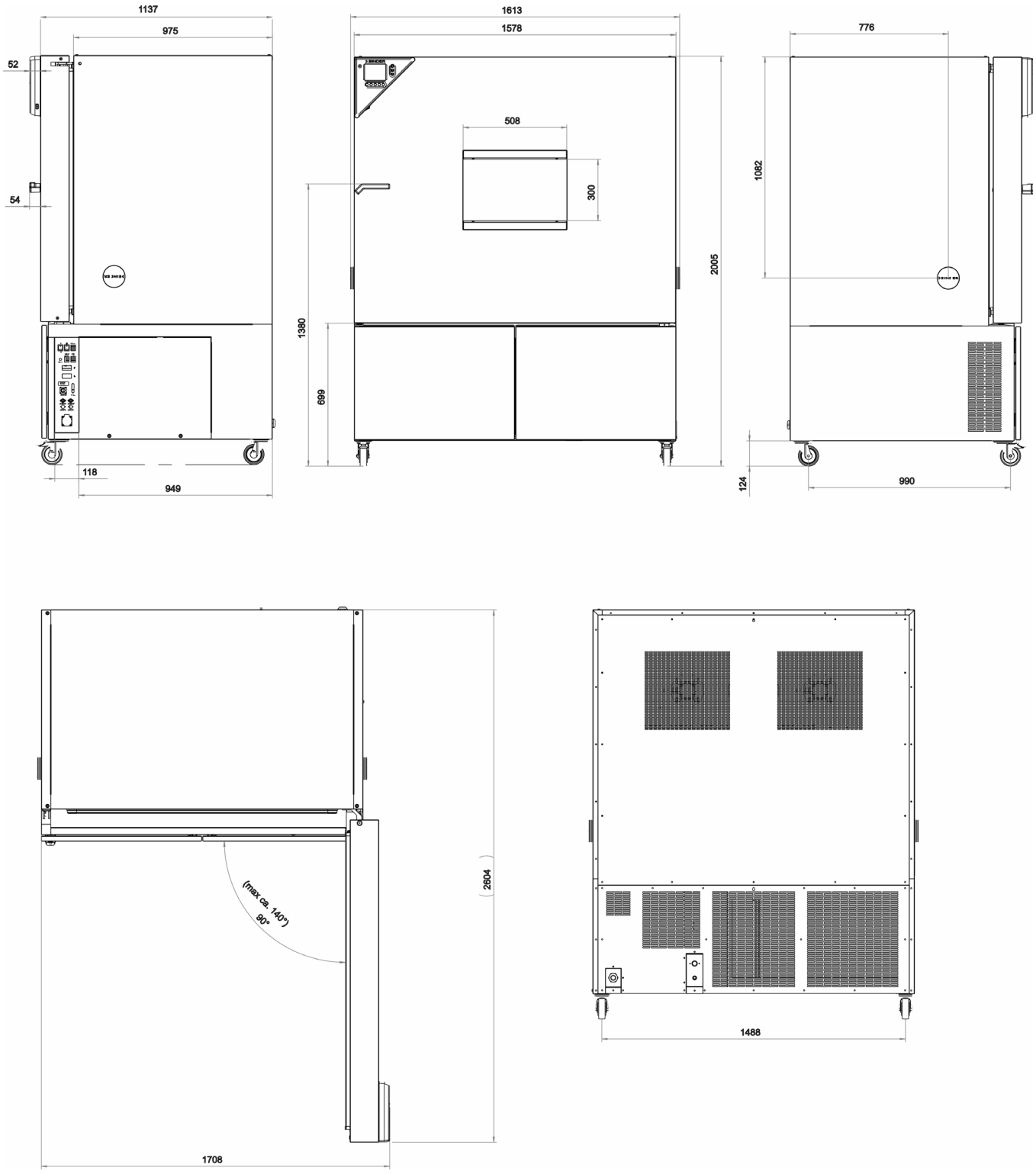


20.12 Dimensions MKFT 240





20.13 Dimensions MKF 720 / MKFT 720



21. Certificates

21.1 EC Declaration of Conformity for MKF

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EG-Konformitätserklärung / EC Declaration of Conformity / Déclaration de conformité CE / Declaración de conformidad CE / Dichiarazione di conformità CE / Декларация соответствия ЕС

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	Wechselklimaschränke Alternating climate chambers Enceintes climatiques pour des conditions variables Cámaras de clima alternante Camere per condizioni climatiche con alternanza Камеры моделирования условий окружающей среды для сложных температурных условий
Typenbezeichnung / Type / Type / Tipo / Tipo / Тип	MKF 115, MKF 240, MKF 720

Die oben beschriebenen Maschinen sind konform mit folgenden EG-Richtlinien (gemäß Veröffentlichung im Amtsblatt der europäischen Kommission):

The machines described above are in conformity with the following EC guidelines (as published in the Official Journal of the European Union):

Les machines décrites ci-dessus sont conformes aux directives CE suivantes (selon leur publication dans le Journal officiel de l'Union européenne):

La máquina descrita arriba cumple con las siguientes directivas de la CE (publicados en el Diario oficial de la Unión Europea):

Le macchine sopra descritte sono conforme alle seguenti direttive CE (secondo la pubblicazione nella Gazzetta ufficiale della Commissione europea):

Машина,указанная выше, полностью соответствует следующим регламентам ЕС (опубликованным в Официальном журнале Европейского Содружества):

- **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
- **2004/108/EC**
  EMV-Richtlinie 2004/108/EG / EMC Directive 2004/108/EC / Directive CEM 2004/108/CE / Directiva CEM 2004/108/CE / Direttiva EMC 2004/108/CE / Директива ЭМС 2004/108/EC

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-Richtlinien.

The machines described above are conform to the mentioned EC 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 Communauté Européenne 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 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 in termini di progettazione, tipo di costruzione ed esecuzione messa da noi in circolazione.

Машины описано выше, соответствует указанным директивам ЕС в отношении требований соответствующей безопасности и здоровья по концепции и конструкции так же как и версия, применяемая нами на рынке.

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Geschäftsführung: Dipl.-Ing. Peter M. Binder | Amtsgericht Tuttlingen, HRB 385 Tu. | Sitz der Gesellschaft: Tuttlingen
Bankverbindung: *Kreissparkasse Tuttlingen* Konto-Nr.: 2266 BLZ: 643 500 70 | IBAN-Code: DE05643 500700 000002266 | SWIFT-Code: SOLA DE S1TUT
Deutsche Bank Tuttlingen Konto-Nr.: 2 138 709 BLZ: 653 700 75 | IBAN-Code: DE56653 70075 0213870900 | SWIFT-Code: DEUT DE SS603

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Best conditions for your success

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:

Sicherheit / Safety / Sécurité / Seguridad / Sicurezza / Нормативы по безопасности
• **EN 61010-1:2010**
• **EN 61010-2-010:2014**
• **EN ISO 12100:2010 + Corr. 1:2011**
• **EN ISO 13732-1:2006**
• **EN 60204-1:2006 + A1:2009 + Corr. :2010**
EMV / EMC / CEM / CEM / EMC / ЭМС
• **EN 61326-1:2013**

78532 Tuttlingen, 18.11.2015
BINDER GmbH

P. M. Binder
Geschäftsführender Gesellschafter
Managing Director
Directeur général
Director general
Direttore Generale
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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Bankverbindung: *Kreissparkasse Tuttlingen* Konto-Nr.: 2266 BLZ: 643 500 70 | IBAN-Code: DE05643 500700 000002266 | SWIFT-Code: SOLA DE S1TUT
Deutsche Bank Tuttlingen Konto-Nr.: 2 138 709 BLZ: 653 700 75 | IBAN-Code: DE56653 70075 0213870900 | SWIFT-Code: DEUT DE SS603

21.2 EC Declaration of Conformity for MKFT

BINDER
Best conditions for your success

EG-Konformitätserklärung / EC Declaration of Conformity / Déclaration de conformité CE / Declaración de conformidad CE / Dichiarazione di conformità CE / Декларация соответствия ЕС

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	Wechselklimaschränke mit Tieftemperatur Alternating climate chambers with deep temperature Enceintes climatiques pour des conditions variables à basses températures Cámaras de clima alternante con zona de baja temperatura Camere per condizioni climatiche con alternanza, con zona di temperatura bassa Камеры моделирования условий окружающей среды для сложных условий в области низких температур
Typenbezeichnung / Type / Type / Tipo / Tipo / Тип	MKFT 115, MKFT 240, MKFT 720

Die oben beschriebenen Maschinen sind konform mit folgenden EG-Richtlinien (gemäß Veröffentlichung im Amtsblatt der europäischen Kommission):

The machines described above are in conformity with the following EC guidelines (as published in the Official Journal of the European Union):

Les machines décrites ci-dessus sont conformes aux directives CE suivantes (selon leur publication dans le Journal officiel de l'Union européenne):

La máquina descrita arriba cumple con las siguientes directivas de la CE (publicados en el Diario oficial de la Unión Europea):

Le macchine sopra descritte sono conforme alle seguenti direttive CE (secondo la pubblicazione nella Gazzetta ufficiale della Commissione europea):

Машина,указанная выше, полностью соответствует следующим регламентам ЕС (опубликованным в Официальном журнале Европейского Содружества):

- **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
- **2004/108/EC**
  EMV-Richtlinie 2004/108/EG / EMC Directive 2004/108/EC / Directive CEM 2004/108/CE / Directiva CEM 2004/108/CE / Direttiva EMC 2004/108/CE / Директива ЭМС 2004/108/EC

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-Richtlinien.

The machines described above are conform to the mentioned EC 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 Communauté Européenne 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 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 in termini di progettazione, tipo di costruzione ed esecuzione messa da noi in circolazione.

Машины описано выше, соответствует указанным директивам ЕС в отношении требований соответствующей безопасности и здоровья по концепции и конструкции так же как и версия, применяемая нами на рынке.

BINDER GmbH Postfach 102 D-78502 Tuttlingen **Hausanschrift:** BINDER GmbH Im Mittleren Ösch 5 D-78532 Tuttlingen
Kontakt: Telefon: +49 (0) 74 62 / 20 05 - 0 | Telefax: +49 (0) 74 62 / 20 05 - 100 | info@binder-world.com | www.binder-world.com
Geschäftsführung: Dipl.-Ing. Peter M. Binder | Amtsgericht Tuttlingen, HRB 385 Tu. | Sitz der Gesellschaft: Tuttlingen
Bankverbindung: *Kreissparkasse Tuttlingen* Konto-Nr.: 2266 BLZ: 643 500 70 | IBAN-Code: DE05643 500700 000002266 | SWIFT-Code: SOLA DE S1TUT
Deutsche Bank Tuttlingen Konto-Nr.: 2 138 709 BLZ: 653 700 75 | IBAN-Code: DE56653 70075 0213870900 | SWIFT-Code: DEUT DE SS603

BINDER
Best conditions for your success

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:

Sicherheit / Safety / Sécurité / Seguridad / Sicurezza / Нормативы по безопасности
• **EN 61010-1:2010**
• **EN 61010-2-010:2014**
• **EN ISO 12100:2010 + Corr. 1:2011**
• **EN ISO 13732-1:2006**
• **EN 60204-1:2006 + A1:2009 + Corr. :2010**
EMV / EMC / CEM / CEM / EMC / ЭМС
• **EN 61326-1:2013**

78532 Tuttlingen, 18.11.2015
BINDER GmbH

P. M. Binder
Geschäftsführender Gesellschafter
Managing Director
Directeur général
Director general
Direttore Generale
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

2 / 2

BINDER GmbH Postfach 102 D-78502 Tuttlingen **Hausanschrift:** BINDER GmbH Im Mittleren Ösch 5 D-78532 Tuttlingen
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Deutsche Bank Tuttlingen Konto-Nr.: 2 138 709 BLZ: 653 700 75 | IBAN-Code: DE56653 70075 0213870900 | SWIFT-Code: DEUT DE SS603

21.3 Certificate for the GS mark of conformity of the “Deutsche Gesetzliche Unfallversicherung e.V.“ (German Social Accident Insurance) DGUV

DGUV Test
Prüf- und Zertifizierungsstelle
Nahrungsmittel und Verpackung
Fachbereich Nahrungsmittel

Bescheinigung
Nr. **NV 14136**
vom 24.06.2014

GS-Prüfbescheinigung

Name und Anschrift des Bescheinigungsinhabers: (Auftraggeber)	**Binder GmbH** Im Mittleren Ösch 5 78532 Tuttlingen
Produktbezeichnung:	**Klimaschränke** **Umweltsimulationsschrank**
Typ:	MK 115, MK 240, MK 720, MKF 115, MKF 240, MKF 720, MKT 115, MKT 240, MKT 720, MKFT 115, MKFT 240, MKFT 720
Prüfgrundlage:	GS-NV 5:2013/06 Prüfgrundsätze für Kühl- und Gefriermaschinen für Industrie und Gewerbe
Zugehöriger Prüfbericht:	NV 14136
Weitere Angaben:	Das Zertifikat bezieht sich auf die im zugehörigen Prüfbericht beschriebene Ausführung des Produkts.

Das geprüfte Baumuster stimmt mit den in § 21 Absatz 1 des Produktsicherheitsgesetzes genannten Anforderungen überein. Der Bescheinigungsinhaber ist berechtigt, das umseitig abgebildete GS-Zeichen an den mit dem geprüften Baumuster übereinstimmenden Produkten anzubringen. Der Bescheinigungsinhaber hat dabei die umseitig aufgeführten Bedingungen zu beachten.

Diese Bescheinigung einschließlich der Berechtigung zur Anbringung des GS-Zeichens ist gültig bis:
23.06.2019

Weiteres über die Gültigkeit, eine Gültigkeitsverlängerung und andere Bedingungen regelt die Prüf- und Zertifizierungsordnung vom August 2012.

Unterschrift (Zertifizierer)

Postadresse: Postfach 10 04 41 • 68136 Mannheim • Hausadresse: Dynamostraße 7-11 • 68165 Mannheim
Telefon: 0621 4456-3430 • Telefax: 0800197755316-625 • E-Mail: maschinensicherheit@bgn.de • www.pz.bgn.de
Zeichen der PZ-Stelle: 612.17 Dr. Poe/Rm • Produktschlüsselnummer: 009001702

PZB04_D
07.10

Rückseite der GS-Prüfbescheinigung

GS-Zeichen

Normalausführung

Bei einer Höhe von 20 mm oder weniger
auch zulässige Ausführung

1)Bescheinigungs-Nummer

1. Der Bescheinigungsinhaber hat die Voraussetzungen einzuhalten, die bei der Herstellung des umseitig genannten Produktes zu beachten sind, um die Übereinstimmung mit dem geprüften Baumuster zu gewährleisten.

2. Die Prüf- und Zertifizierungsstelle des Fachbereichs Nahrungsmittel führt in regelmäßigen Abständen Kontrollmaßnahmen zur Überwachung der Herstellung und rechtmäßigen Verwendung des GS-Zeichens durch.

3. Die für die Herstellung verantwortliche Person hat sich zur Einhaltung der Voraussetzungen nach Nummer 1 und Duldung der Kontrollmaßnahmen verpflichtet.

4. Die Prüf- und Zertifizierungsstelle entzieht dem Bescheinigungsinhaber die Zuerkennung des GS-Zeichens, wenn sich die Anforderungen nach § 21 Absatz 1 Produktsicherheitsgesetz geändert haben oder die Voraussetzungen nach Nummer 1 nicht eingehalten werden.

5. Das GS-Zeichen darf nur verwendet und mit ihm darf nur geworben werden, wenn die Voraussetzungen nach § 22 Produktsicherheitsgesetz erfüllt sind.

22. Product registration

Online Product Registration

Register your BINDER now!

www.binder-world.com/register

The registration is free and takes just a few seconds
Advantages:

- Short response times if service is needed
- Fair prices when relocating or installing equipment
- Calibration as required at no charge in case of recalls
- Free information on news, product upgrades and accessories

Easy registered in 3 steps:

1. List serial number here: ☐☐-☐☐☐☐☐
2. Go online: www.binder-world.com/register
3. Register serial number

23. Contamination clearance certificate

23.1 For chambers located outside North America and Central America

Declaration regarding safety and health

Erklärung zur Sicherheit und 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.	**Unit/ 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 unit / 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 unit /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 unit 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 unit 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 unit / 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.

23.2 For chambers in North America and Central America

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 unit was received		
Was the unit unboxed?	○ Yes ○ No	
Was the unit plugged in?	○ Yes ○ No	
Was the unit in operation?	○ Yes ○ No	
Pictures of unit 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.	**Unit/ 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 unit /component part has not been in contact with radioactivity

4.3 Any Hazardous substances were removed from the unit / component part, so that no hazard exists for a persons in the shipping, handling or repair of these returned unit

4.4 The unit was securely packaged in the original undamaged packaging and properly identified on the outside of the packaging material with the unit 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.