

Operating Manual

APT.line™ KBF

Climatic chamber for constant conditions
with program control

APT.line™ KBF-ICH

Climatic chamber for constant conditions
with program control
with ICH compliant illumination in the doors

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EG - KONFORMITÄTSERKLÄRUNG
EC - DECLARATION OF CONFORMITY
CE - DECLARATION DE CONFORMITE

Anbieter / Supplier / Fournisseur: BINDER GmbH
Anschrift / Address / Adresse: Im Mittleren Ösch 5, D-78532 Tuttlingen
Produkt / Product / Produit: Klimaschränke für Konstantklima mit Programmregelung
Climatic chambers for constant conditions with program control
Enceintes climatiques pour des conditions constantes à régulation programmable
Typenbezeichnung / Type / Type: KBF 115, KBF 240, KBF-ICH 240, KBF 720, KBF-ICH 720

Die oben beschriebenen Produkte sind konform mit folgenden harmonisierten Normen:
The products described above are in conformity with the following harmonized standards:
Les produits décrits ci-dessus sont conformes aux normes harmonisées suivantes:

Sicherheit / safety / sécurité:

IEC/CEI 61010-1:2001 Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte – Teil 1: Allgemeine Anforderungen
Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements
Règles de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire – Partie 1 : Prescriptions générales

IEC/CEI 61010-2-010:2003 Sicherheitsbestimmungen für elektrische Meß-, Steuer-, Regel- und Laborgeräte – Teil 2-010: Besondere Anforderungen an Laborgeräte für das Erhitzen von Stoffen
Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-010: Particular requirements for laboratory equipment for the heating of materials
Règles de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire. Partie 2-010 : Prescriptions particulières pour appareils de laboratoire utilisés pour l'échauffement des matières

EMV / EMC / CEM:

IEC/CEI 61326:1997 + A1:1998 + A2:2000 Elektrische Betriebsmittel für Leittechnik und Laboreinsatz – EMV-Anforderungen
Electrical equipment for measurement, control and laboratory use – EMC requirements
Matériels électriques de mesure, de commande et de laboratoire – Prescriptions relatives à la CEM

**Die oben beschriebenen Produkte sind konform mit folgenden EG-Richtlinien:
The products described above are in conformity with the following EC guidelines:
Les produits décrits ci-dessus sont conformes aux directives CE suivantes:**

Niederspannungsrichtlinie
73/23/EWG, Änderung 93/68/EWG
Low voltage directive
73/23/EEC, amended 93/68/EEC
Directive basse tension
73/23/CEE, modifiée 93/68/CEE

Richtlinie 73/23/EWG des Rates vom 19. Februar 1973 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen

Council Directive of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (73/23/EEC)

Directive 73/23/CEE du Conseil, du 19 février 1973, concernant le rapprochement des législations des États membres relatives au matériel électrique destiné à être employé dans certaines limites de tension

EMV-Richtlinie
89/336/EWG, Änderung 93/68/EWG
EMC Directive
89/336/EEC, amended 93/68/EEC
Directive CEM
89/336/CEE, modifiée 93/68/CEE

Richtlinie 89/336/EWG des Rates vom 3. Mai 1989 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility

Directive 89/336/CEE du Conseil du 3 mai 1989 concernant le rapprochement des législations des États membres relatives à la compatibilité électromagnétique

**Die oben beschriebenen Produkte tragen entsprechend die Kennzeichnung CE.
The products described above, corresponding to this, bear the CE-mark
Les produits décrits ci-dessus, en correspondance, portent l'indication CE.**

D-78532 Tuttlingen, 10.01.2006

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Dear customer,

For the proper operation of the climatic chamber KBF / KBF-ICH, it is necessary to read this operating manual completely and carefully and to observe the given instructions.

1. Safety

This operating manual is part of the scope of delivery. Always keep it at hand.

To avoid injuries and damage observe the safety instructions of the operating manual.

	 WARNING
<p>Failure to observe the safety instructions. Serious injuries and unit damage.</p> <ul style="list-style-type: none"> ➤ Observe the safety instructions in this operating manual. ➤ Carefully read the complete operating instructions of the climatic chamber KBF / KBF-ICH. 	

1.1 Legal considerations

This operating manual contains information necessary for the intended use, correct installation, start-up and operation, and for the maintenance of the unit.

Understanding and observing the instructions in this operating manual are prerequisites for hazard-free use and safety during operation and maintenance.

This operating manual cannot cover all conceivable applications. If you would like additional information, or if special problems arise that you feel are not sufficiently addressed in this manual, please ask your dealer or contact us directly.

Furthermore, we note that the contents of this operating manual are not part of an earlier or existing agreement, promise, 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 harmonized denominations and symbols indicate dangerous situations following the harmonization of ISO 3864-2 and ANSI Z535.4.

Signal word panel

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

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

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

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 of the product and/or its functions or of a property in its ambience.

Safety alert symbol




Use of the safety alert symbol indicates **risk of injury**.

Observe all measures that are marked with the safety alert symbol in order to avoid death or injury.

Pictograms

Warning signs			
Electrical hazard	Hot surface	Explosive substances	Tipover hazard
High humidity	UV light hazard	Pollution Hazard	Harmful substances
Biohazard			
Mandatory action signs			
Mandatory regulation	Read operating instructions	Pull the power plug	Lift with several persons
Lift with mechanical assistance	Environment protection		
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.
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Word message panel structure

<p>Type / cause of hazard.</p> <p>Possible consequences.</p> <ul style="list-style-type: none"> ⊘ Instruction how to avoid the hazard: prohibition ➤ Instruction how to avoid the hazard: mandatory action
--

Observe the other notes and information not specially emphasized in the same way, in order to avoid disturbances which could result in direct or indirect injuries or property damage.

1.3 Localization / position of safety labels at the unit

Following labels are located on the unit:

Pictograms (warning signs)	Service label
 Hot surface	
 UV light hazard	

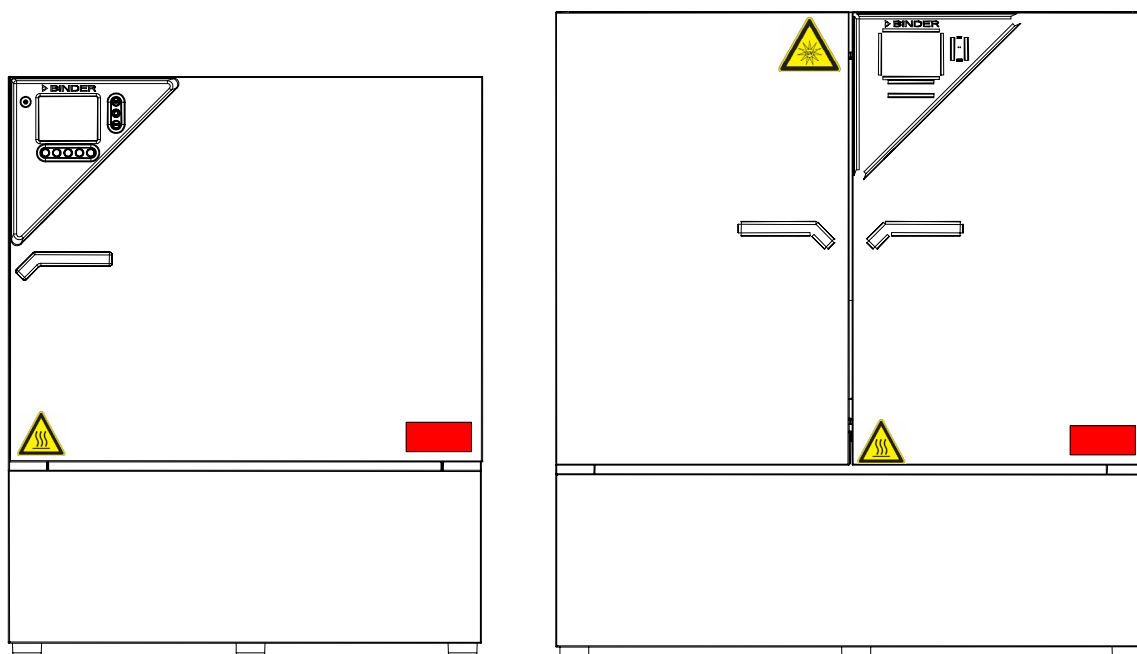



Figure 1: Position of labels at the unit

	Keep safety labels complete and legible.
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Replace safety labels that are no more legible. Contact the BINDER service.

1.4 Type plate



Figure 2: Position of type plate

Nominal temperature	100°C 212°F	2,76 kW 230 V 1 N ~	 	TYPE PLATE ACC. TO BGV D4 § 5 MAX. OPERATING PRESSURE 15 BAR REFRIGERANT TYPE R 134 A MAX. FILLING WEIGHT 315 G MINIATURE FUSE 16 A SEMI TIME LAG
Enclosure protection	IP 20	12,0 A		
Temp. safety device	DIN 12880	50/60 Hz		
Class	3.1			
Art. No.	9020-0096	US PATS 4585923 / 5222612 / 5309981		
Project No.		5405194 / 5601143 / 5773287 / 6079403		



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KBF 720 Serial No. 00-00000
 Made in Germany

Figure 3: Type plate (example of KBF 720 regular unit)

Indications of the type plate		Information
Nominal temperature	100°C 212°F	Nominal temperature
Enclosure protection	IP 20	IP type of protection 20 acc. to EN 60529
Temp. safety device	DIN 12880	Temperature safety device acc. to standard DIN 12880
Class	3.1	Temperature safety device, class 3.1
Art. No.	9020-0096	Art. No. 9020-0096
Project No.	---	(Special application acc. to project no.)
2,76 kW		Nominal power 2.76 kW
230 V 1 N ~		Nominal voltage 230 V ± 10%, single-phase unit
12,0 A		Nominal current 12.0 Amp
50/60 Hz		Mains frequency 50/60 Hz
Type plate acc. to BGV D4 § 5		Type plate acc. to guideline BGVD4 § 5
Max. operating pressure 15 bar		Max operating pressure 15 bar in the refrigerating system
Refrigerant type R 134 a		Refrigerant type R 134 A
Max. filling weight 315 g		Max. filling weight of refrigerant 315 g
Miniature fuse 16 A semi time lag		Miniature fuse semi time lag (M) 16 Amp
KBF 720		Model KBF 720
Serial No. 00-00000		Serial No. 00-00000


Symbol on the type plate	Information
	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).
	The equipment is certified in the GOST R certification system of GOSTSTANDARD Russia.

1.5 General safety instructions on installing and operating the climatic chamber

With regard to operating the climatic chamber KBF / KBF-ICH and to the installation location, please observe the regulations BGR 120 of the German professional association of the chemical industry (formerly ZH 1/119 laboratory guidelines of the employers' liability insurance association) (for Germany).

The BINDER GmbH is responsible for safety-related unit properties only if skilled electricians or qualified personnel authorized by BINDER perform all maintenance and repair, and if components relating to chamber safety are replaced in case of failure with original spare parts.



To operate the unit, use only original BINDER accessories or accessories of third-party suppliers authorized by BINDER. The user is responsible for any risk when using unauthorized accessories.

	CAUTION
	<p>Danger of overheating. Damage of the unit.</p> <ul style="list-style-type: none"> ⊘ Do NOT install the unit in unventilated recesses. ➤ Ensure sufficient ventilation for carrying-off the heat.

The climatic chamber KBF / KBF-ICH must NOT be operated in hazardous locations.



	 DANGER
	<p>Explosion hazard. Danger of life.</p> <ul style="list-style-type: none"> ⊘ Do NOT operate the unit in potentially explosive areas. ⊘ NO explosive dust or air-solvent mixture in the ambiance.

The climatic chamber KBF / KBF-ICH does not dispose of any measures of explosion protection.



	 DANGER
	<p>Explosion hazard. Danger of life.</p> <ul style="list-style-type: none"> ⊘ Do NOT introduce any substance combustible or explosive at working temperature into the climatic 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 will form. The temperature inside the chamber must lie below the flash point or below the sublimation point of the charging material. Keep informed about the physical and chemical properties of the charging material, as well as the contained moisture constituent and its behavior under addition of heat energy and humidity.

Keep informed about any potential health risks caused by the charging material, the contained moisture constituent or by reaction products that may arise during the temperature process. Take adequate measures to exclude such risks prior to putting the climatic chamber into operation.

	 DANGER
	<p>Electrical hazard.</p> <p>Danger of life.</p> <p>∅ The unit must NOT become wet during operation or maintenance.</p>


The climatic chambers have been produced in accordance to the VDE regulations and were routinely tested in accordance to VDE 0411.

	 CAUTION
	<p>The glass doors and the inner chamber will become hot during operation.</p> <p>Danger of burning.</p> <p>∅ Do NOT touch the glass doors, the inner surfaces and the charging material during operation.</p>

 	 WARNING
	<p>Tipover hazard.</p> <p>Danger of injury.</p> <p>Damage of the unit and the charging material.</p> <p>Housing cover breakaway.</p> <p>∅ Do NOT climb the lower housing cover.</p> <p>∅ Do NOT charge the lower housing cover with heavy objects while the unit door is open.</p>

1.6 Intended use

Climatic chambers series KBF / KBF-ICH are designed for exact conditioning of 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.

	<p>Respecting the instructions in this operating manual and conducting regular maintenance work (chap. 16) is part of the intended use.</p>
---	---

1.7 Resistance of the humidity sensor against harmful substances

The following list of harmful substances refers only to the humidity sensor and does not consider any other materials incorporated in the unit 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 only very small influence, whereas others may influence the sensor to a large extent.

- The following gases do not influence the sensor and the humidity measurement: Argon (Ar), carbon dioxide (CO₂), helium (He), hydrogen (H₂), neon (Ne), nitrogen (N₂), nitrous oxide (N₂O), oxygen (O₂)
- The following gases do not or only to a minor extent influence the sensor and the humidity measurement: Butane (C₄H₁₀), ethane (C₂H₆), methane (CH₄), natural gas propane (C₃H₈)
- The following gases do not or only 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/m ³	ppm	mg/m ³
Ammonia	NH ₃	20	14	5500	4000
Acetone	CH ₃ COCH ₃	500	1200	3300	8000
Benzene		300	1200		150000
Chlorine	Cl ₂	0.5	1.5	0.7	2
Acetic acid	CH ₃ COOH	10	25	800	2000
Ethyl acetate	CH ₃ COOC ₂ H ₅	400	1400	4000	15000
Ethanol	C ₂ H ₅ OH	500	960	3500	6000
Ethylene glycol	HOCH ₂ CH ₂ OH	10	26	1200	3000
Formaldehyde	HCHO	0.3	0.37	2400	3000
Isopropanol	(CH ₃) ₂ CHOH	200	500	4800	12000
Methanol	CH ₃ OH	200	260	3500	6000
Methyl ethyl ketone	C ₂ H ₅ COCH 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 ₂ S	10	15	350	500
Nitrogen oxides	NO _x	5	9	5	9
Sulphur dioxide	SO ₂	5	13	5	13
Toluol	C ₆ H ₅ CH ₃	100	380	1300	5000
Xylene	C ₆ H ₅ (CH ₃) ₂	100	440	1300	5000

These values are to be considered as approximate values. The sensor resistance largely depends on the temperature and humidity conditions during the time of exposition to harmful substances. Avoid simultaneous condensation. Tolerated error of measurement: ± 2 %r.H. The maximum work place threshold limit value is the value which can be regarded 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 also not possible to measure smoke gases.

	 DANGER
	<p>Explosion hazard.</p> <p>Danger of life.</p> <ul style="list-style-type: none"> ⊘ Do NOT introduce any substance combustible or explosive at working temperature into the climatic chamber. ⊘ NO explosive dust or air-solvent mixture in the inner chamber.

2. Unit description

The climatic chambers KBF / KBF-ICH are equipped with a multifunctional microprocessor screen controller with 2-channel technology for temperature and humidity and a digital display accurate to one-tenth of a degree resp. 0.1% r.H. With its comprehensive program control functions, the screen program controller MB1 allows the high precision course of temperature and humidity cycles.

With its microprocessor controlled humidifying and dehumidifying system the KBF / KBF-ICH is a high-precision climatic chamber. It completely meets the requirements of the stipulated stability and durability test for pharmaceutical products:

- Stability tests acc. to ICH guideline CPMP/ICH/2736/99 (Q1A)
- Photostability tests acc. to ICH guideline CPMP/ICH/279/95 (Q1B) (KBF-ICH)

Furthermore, it allows 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.

An electrode steam humidifying system humidifies the air. Water conductivity is the only demand on water quality (chap. 4.1).

The inner chamber, the pre-heating chamber and the inside of the doors are all made of stainless steel (material no. 1.4301 in Germany). The housing is RAL 7035 powder-coated. All corners and edges are completely coated.

The climatic chambers KBF / KBF-ICH are regularly equipped with a serial interface RS 422 for computer communication, e.g. with the communication software APT-COM™ 3 DataControlSystem (option, chap. 14.1) For further options, see chap. 19.5.

The KBF 720 / KBF-ICH 720 models are equipped with four castors. Both front castors can be locked by brakes.

The chamber can be operated in a temperature range from -10°C (KBF) resp. -5°C (KBF-ICH) up to +100°C and a humidity range of 10% r.H. to 90% r.H.

2.1 Unit overview

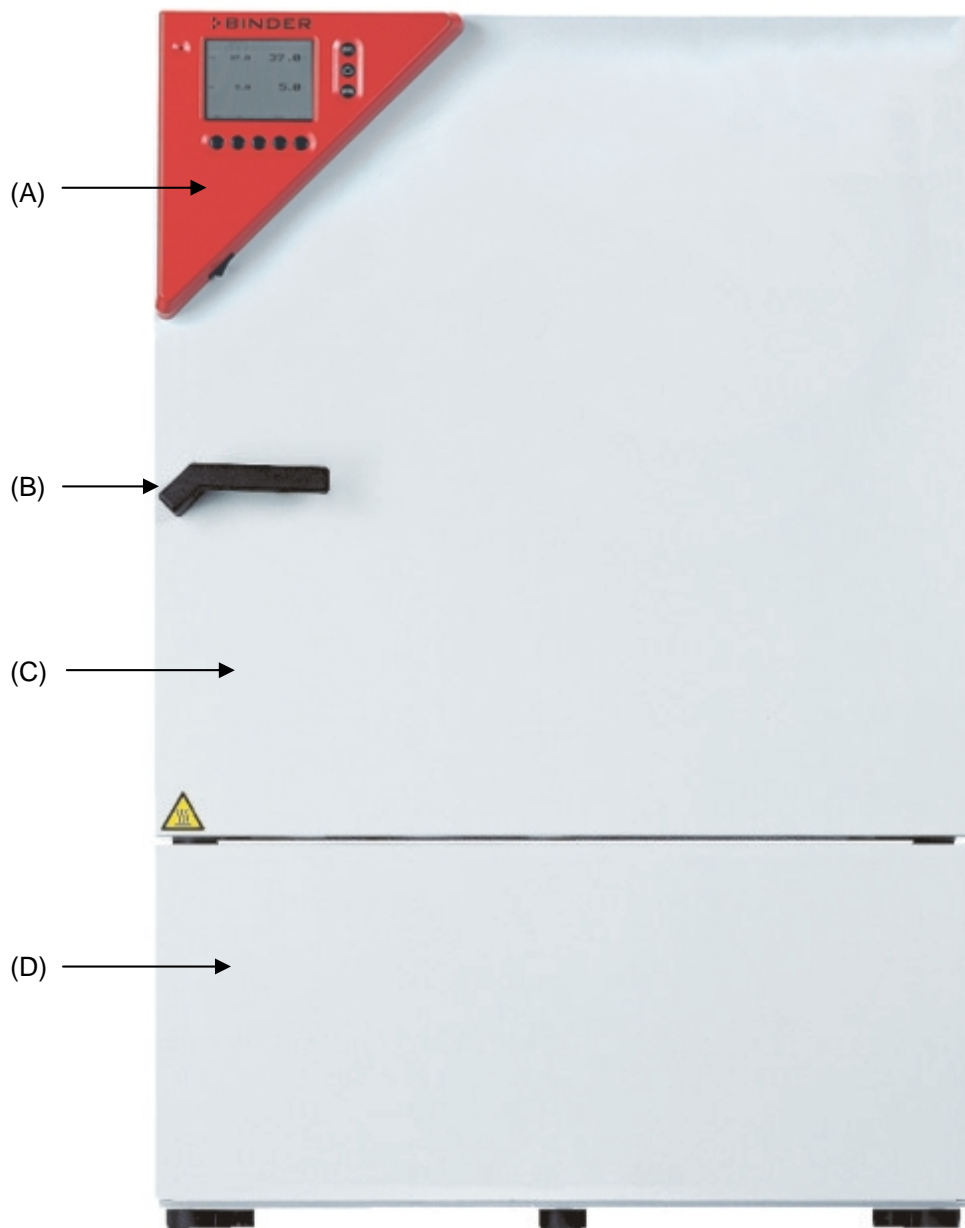


Figure 4: KBF 115

- (A) Instrument box
- (B) Door handle
- (C) Outer door
- (D) Refrigerating machine and humidity generation module

2.2 Lateral control panel KBF / KBF-ICH

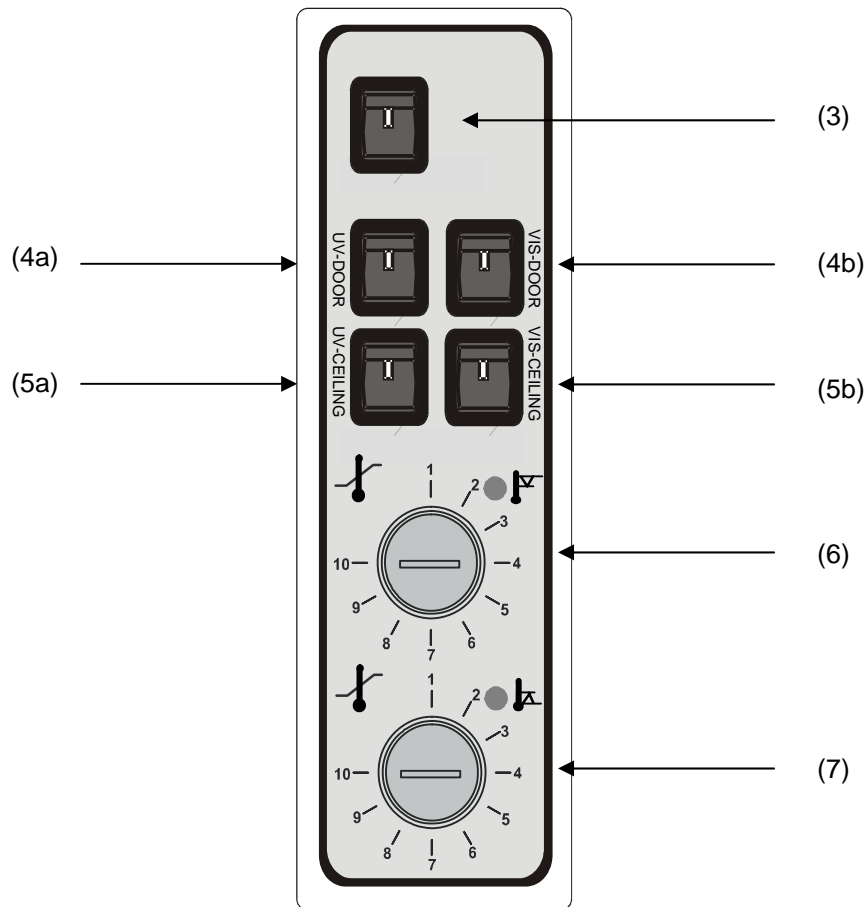


Figure 5: Lateral control panel KBF / KBF-ICH at the left side of the humidity module with options temperature safety device class 3.3, and ICH compliant illumination under the ceiling

- (3) Humidity switch ON/OFF
- (4a) Switch for ICH compliant illumination in the chamber doors (UVA) (KBF-ICH)
- (4b) Switch for ICH compliant illumination in the chamber doors (cool white) (KBF-ICH)
- (5a) Switch for ICH compliant illumination under the ceiling (UVA) (option)
- (5b) Switch for ICH compliant illumination under the ceiling (cool white) (option)
- (6) Temperature safety device class 3.1 (part of option safety device class 3.3)
- (7) Temperature safety device class 3.2 (part of option safety device class 3.3)

2.3 Instrument box KBF / KBF-ICH



Figure 6: Triangle instrument box with option interior lighting

- (1) Microprocessor program controller MB1 with 2-channel technology for temperature and humidity
- (2) Main switch ON/OFF
- (8) Switch for interior lighting (option)




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

3.1 Unpacking, and checking equipment and scope of delivery

After having unpacked, please check the unit and its optional accessories, if any, based on the delivery note for completeness and for transportation damage. If transportation damage has occurred, immediately inform the carrier.

The final tests of the manufacturer might cause traces of the racks at the inner surfaces. This has no impact on the function and performance of the unit.

Please remove any transportation protection devices and adhesives in / on the unit and at the doors and take out the operating manuals and accessory equipment.

CAUTION	
	<p>Sliding or tilting of the unit.</p> <p>Damage of the unit.</p> <ul style="list-style-type: none"> ⊘ Do NOT lift or transport the unit using either the door handle or the door or at the lower housing. ➤ Lift units size 115 and 240 near the 4 unit feet from the pallet by aid of 4 persons. ➤ Lift units size 720 using technical devices (fork lifter) from the pallet. Set the fork lifter only from the front or rear in the middle of the unit. ⊘ Do NOT set the fork lifter from the unit side.
	
	

If necessary to send back the unit, please use the original packing and respect the advice for safe lifting and transportation (chap. 3.2).

For disposal of the transport packing, see chap. 17.1.

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




Second-hand units are units that have been used during a short time for tests or exhibitions. They are scrupulously tested before resale. BINDER guarantees the technically flawless state of the chamber.

Second-hand units are marked as such with a sticker on the unit door. Please remove the sticker before commissioning the unit.

3.2 Advice for safe lifting and transportation

The front castors of the KBF / KBF-ICH 720 can be blocked by brakes.

Following operation, the unit must be drained off for transport. To pump off the water from the humidifying system, close the water supply, switch on humidity switch (3), and switch on and off the unit twice allowing it each time to run about 2 minutes. Respect the advice for temporal decommissioning (chap. 17.2).

CAUTION	
	<p>Sliding or tilting of the unit.</p> <p>Damage of the unit.</p> <ul style="list-style-type: none"> ➤ Transport the unit only in its original packaging. ➤ Secure the climatic chamber with transport straps for transport. ⊘ Do NOT lift or transport the unit using either the door handle or the door or at the lower housing. ➤ Lift units size 115 and 240 near the 4 unit feet by aid of 4 persons. ➤ Lift units size 720 using technical devices (fork lifter). Set the fork lifter only from the front or rear in the middle of the unit. ⊘ Do NOT set the fork lifter from the unit side.
	
	

- Permissible ambient temperature range during transport: -10°C to +60°C.


You can order transport packing for transport purpose at the BINDER Service.

3.3 Storage

Intermediate storage of the unit is possible in a closed and dry room. Respect the advice for temporal decommissioning (chap. 17.2).

- Permissible ambient temperature range during storage: -10°C to +60°C.
- Permissible ambient humidity: max. 70 % r.H., non-condensing


Store units only with the humidifying system drained off and a dry interior. To pump off the water from the humidifying system, close the water supply, switch on humidity switch (3), and switch on and off the unit twice allowing it each time to run about 2 minutes.

	CAUTION
	<p>Condensation by excess humidity.</p> <p>Danger of corrosion on the housing after operating at humidity values > 70 % r.H. for a long period.</p> <ul style="list-style-type: none"> ➤ Dry the appliance completely before shut-down: <ul style="list-style-type: none"> – Set the humidity to 0 % r.H. and switch on humidity switch (3). – Set the temperature set point to 60°C for approx. 2 hours (Manual mode). – Only then, shut down the unit at the main switch (2).


If following storage in a cold location the unit is transferred to the installation site for start-up, condensation is possible. Wait at least one hour until the chamber has attained ambient temperature and is completely dry.


3.4 Location of installation and ambient conditions

Set up the climatic chamber on a plane surface, free from vibration at a well-ventilated, dry location and align it using a spirit level. The site of installation must be capable of supporting the unit's weight (see technical data, chap. 19.4).

	CAUTION
	<p>Danger of overheating.</p> <p>Damage of the unit.</p> <ul style="list-style-type: none"> ⊘ Do NOT set up units in non-ventilated recesses. ➤ Ensure sufficient ventilation for carrying-off the heat.

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


	<p>The ambient temperature should not be substantially higher than the indicated ambient temperature of +20°C to which the specified technical data relate. In the case of different ambient conditions, deviations from the indicated data are possible.</p>
---	---

	<p>With each degree of ambient temperature >20°C, the refrigeration power decreases by 1.5 K.</p>
---	--


- Permissible ambient humidity: 70 % r.H. max., non-condensing.
- Installation height: max. 2000 m above sea level.

A water tap (1 bar to 10 bar) with normal tap water (approx. 200 µS/cm to 500µS/cm, tolerance range 100 µS/cm to 800 µS/cm) is necessary for the installation of the humidification system (chap. 4.1). Furthermore, a water drain with descending gradient is required (chap. 4.3).

When placing several units of the same size side by side, maintain a minimum distance of 250 mm between each unit. Wall distances: rear 100 mm, sides 160 mm. Spacing above the unit of at least 100 mm must also be accounted for.

	CAUTION
	<p>Danger by stacking.</p> <p>Damage of the units.</p> <ul style="list-style-type: none"> ⊘ Do NOT place climatic chambers on top of each other.


The climatic chamber KBF / KBF-ICH must not be installed and operated in potentially explosive areas.

	 DANGER
	<p>Explosion hazard. Danger of life.</p> <ul style="list-style-type: none"> ∅ Do NOT operate the unit in potentially explosive areas. ∅ NO explosive dust or air-solvent mixture in the ambience.

4. Installation and connections

4.1 Freshwater supply

An enclosure inside the unit contains the connection kit for freshwater and wastewater. Install the freshwater connection using either the enclosed water hose or another pressure-resistant one. The water hose must be heat resistant up to 95°C. Secure the connection with a hose clamp. Before switching on the unit, check the connection for leaks.

	<p>As the appliance only lets in freshwater when required, there is no continuous water flow.</p>
---	---

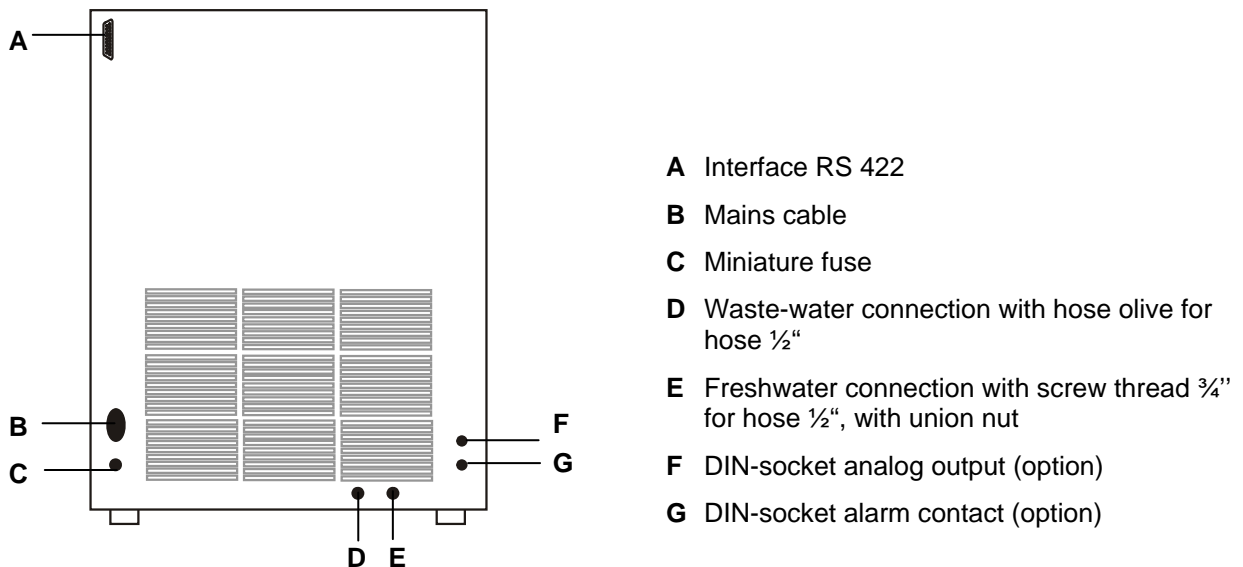


Figure 7: Rear view KBF / KBF-ICH with water connections



In order to guarantee perfect humidifying, observe the following points with regard to the freshwater supply:

- Supply pressure 1 to 10 bar
- Water type: Tap water with conductivity of 200 μ S to 500 μ S/cm (tolerance range 100 μ S/cm to 800 μ S/cm). Test: Let boil at least 1 liter of tap water in a suitable pot for 10 minutes in order to precipitate the temporary hardness; then measure the conductivity in the upper half of the volume.

In case of deviating values, please contact the BINDER service to have installed larger electrodes (Art. No. 5005-0056) in case of too low conductivity, or a separating wall (Art. No. 6002-0088) in case of too high conductivity.
- Total hardness 28.4 mg Ca/l up to 56.8 mg Ca/l

In case of deviating values, please contact the BINDER service.
- Do NOT use softened water (soft water, distilled water, deionized or demineralized water).
- Water intake temperature NOT below +5°C. Maximum water intake temperature 40°C.
- The freshwater intake should be provided with a shut-off slide or water-tap.
- For the fresh water supply, fix the delivered adapter on the thread of the freshwater connection (E) at the rear of the chamber and put on the hose.
- Protect both the fresh water and the waste water supply at both sides by the delivered hose clamps.



CAUTION

Too high or too low conductivity and / or hardness of freshwater.

Malfunctions and reduced performance of the unit.

- ⊘ Do NOT operate the unit with softened water (soft water, distilled water, deionized or demineralized water).
- ⊘ Do NOT use water of deviating quality (too high or too low conductivity and / or hardness).
- In case of deviating water quality, please contact the BINDER service.



The BINDER GmbH is NOT responsible for the water quality at the customer.

Any problems and malfunctions that might arise following use of water of deviating quality is excluded from liability by the BINDER GmbH.

Safety kit for connection KBF – water main:

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

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

Protection principle of hose burst protection:

Whenever a strong water flow of about 18 l / min. occurs, e.g. caused by a burst water hose, a valve automatically cuts off the water supply, what can be heard as a clicking noise. The water supply now remains interrupted until its manual release.

Assembly:

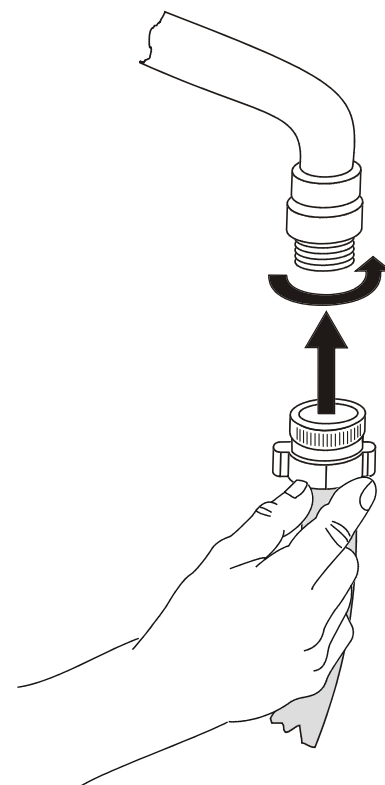
Screw the hose burst protection device onto a water tap with a G $\frac{3}{4}$ inch right turning thread connection. The connection is self-sealing. Establish the connection between the safety kit and the chamber with a part of the supplied hose. Protect both ends of the hose by the supplied hose clamps.

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.


Release of the reflux protection device:

In case the burst protection device interrupted the water supply, find first the reason and remove it as far 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 demount the safety kit to check the valve by hand for function and calcification or blockage.

CAUTION	
	<p>Danger of calcification.</p> <p>Impairment of valve function.</p> <ul style="list-style-type: none"> ➤ Have a plumber inspect the valve annually. ➤ Remove calcifications by citric acid or acetic acid solutions. ➤ Afterwards test the function and the tightness of the mounted unit.

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

4.2 Hose burst protection device with reflux protection device (option)

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

Protection principles:

Whenever a strong water flow of about 18 l / min. occurs, e.g. caused by a burst water hose, a valve automatically cuts off the water supply, what can be heard as a clicking noise. The water supply now remains interrupted until its manual release.

An eventual 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 reflux protection device provides protection in case of short-term utilization of substances with low risk potential. When using substances bearing a higher risk potential, install a pipe disconnecter in order to guarantee absolute protection. It is the user's responsibility to prevent, according to national standards, any reflux of contaminated water into the drinking water system.

Assembly:

The regularly delivered original parts – hose burst protection device, hose nozzle with screwing – are not needed.

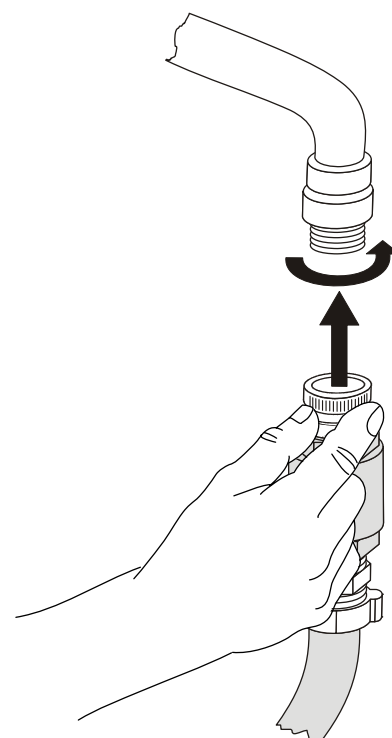
Screw the pre-mounted assembly of hose burst protection device and reflux protection device onto a water tap with a G $\frac{3}{4}$ inch right turning thread connection. The connection is self-sealing. Establish the connection between the safety kit and the chamber with a part of the supplied hose. Protect both ends of the hose by the supplied hose clamps.

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

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


Release of the reflux protection device:

In case the burst protection device interrupted the water supply, find first the reason and remove it as far 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 device with reflux protection device:

Calcification can impair the function of both valves. We recommend an annual inspection by a skilled plumber. The plumber should demount the safety kit with reflux protection device to check the two valves by hand for 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.
	➤ Afterwards test the function and the tightness of the mounted unit.

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

4.3 Wastewater connection

Fasten the wastewater hose to the connection on the provided appliance (olive \varnothing 14 mm). Observe the following points:


- You can use a part of the delivered tap water hose as a drainage hose. In case another hose is used, it has to be permanently resistant against at least 95°C.
- The wastewater hose must be inclined at a gradient of at least 1 cm per meter.
- Never place the wastewater hose at a positive inclination because otherwise the humidity module could fill with water during clearing.
- Protect both ends of the drainage hose with two of the four delivered hose clamps.
- Realize the wastewater connection via a siphon, if possible ventilated, or via a pipe disconnecter in order to balance air pressure fluctuation in the wastewater system and not to transmit it into the steam generator. Pressure fluctuation inside the steam generator can cause humidity fluctuation in the KBF / KBF-ICH inner chamber.

	CAUTION
	<p>Backpressure in the humidity module.</p> <p>Damage of the equipment by excess-voltage.</p> <ul style="list-style-type: none"> ➤ The outlet must be absolutely free of counter-pressure along its entire length ➤ Ensure correct installation of the wastewater connection.

Water is automatically pumped out when required (water level in the humidifying system no longer sufficient, water conductivity too high). Then new water is let in.

4.4 Electrical connection

- The climatic chamber has a fixed mains connection cable 1800 mm in length and a shock-proof plug.
- The unit is equipped with a semi time-lag fine-wire fuse against excess-current:
KBF 115: **10 Amp.**
KBF 240, KBF-ICH 240, KBF 720, KBF-ICH 720: **16 Amp.**
- Prior to connection and start-up, check the mains voltage. Compare the values to the data specified on the type plate of the unit (unit front behind the door, bottom left-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)
- Pollution degree (acc. to IEC 1010-1): 2
- Over-voltage category (acc. to IEC 1010-1): II

	CAUTION
	<p>Danger of incorrect mains voltage.</p> <p>Damage of the equipment.</p> <ul style="list-style-type: none"> ➤ Check the mains voltage before connection and start-up. ➤ Compare the mains voltage to the data indicated on the type plate.

See also electrical data (chap. 19.4).

5. Start up

- Having connected the supply lines (chap. 4), open the water-tap for freshwater supply.
- Switch on the humidifying and dehumidifying system with switch (3) (humidity switch ON/OFF).
- Switch on the unit by the main switch (2).

Switching on the main switch (2) with switched on humidification system causes pumping out the water in the steam humidifying system for 45 seconds. Fresh water is automatically let in. After the first switching on of the chamber or after an interruption of the power supply the relative humidity will increase only after a delay of about 20 minutes. During this period, the relative humidity can drop considerably.

5.1 Function overview of screen program controller MB1

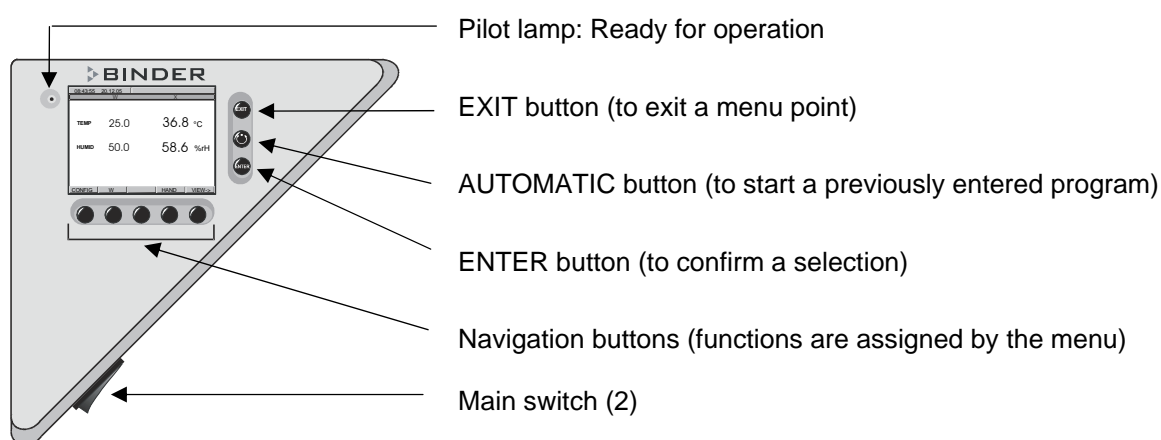


Figure 8: Temperature and humidity program controller MB1

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

- Channel 1: Temperature in °C. Range without humidity -10°C (KBF) resp. -5°C (KBF-ICH) up to 100°C.
- Channel 2: Relative humidity in % r.H. Range 10 % r.H. to 90 % r.H.

You can enter the desired set point values in Manual Mode or Program Mode (chap. 5.2) in the screen controller.

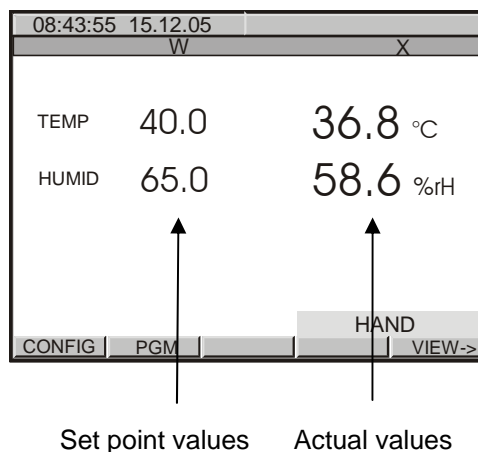


Figure 9: Normal display of the MB1 program controller in Manual mode

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 or dehumidification. Operation line 1 (dehumidification off) is switched on. The fan turns at 50% rate.
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 program controller MB1 allows 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. 14.1) specially developed by BINDER.

5.3 Behavior after power failure

After power return, the unit continues operating in the operating mode actual before power failure. 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 actually reached during program operation. The power failure is noted in the event list (chap. 6.2). No error message is displayed indicating that a power failure has taken place.

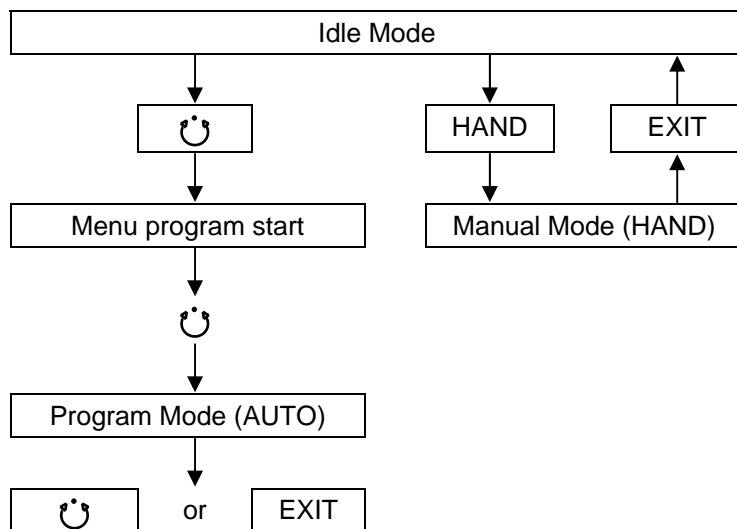
5.4 Switching on the unit

Put the main switch (2) in position I. The pilot lamp shows the unit being ready for operation.

	Observe a delay time of about 30s between switching Off and On again. Otherwise an initialization problem might occur (display showing e.g. “-1999”).
---	---

In case the main switch is already in position I and yet the controller screen is dark, the chamber is in stand-by mode. Switch on the unit by pressing any button. When switched on, the unit operates in the operating mode entered before switching 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:

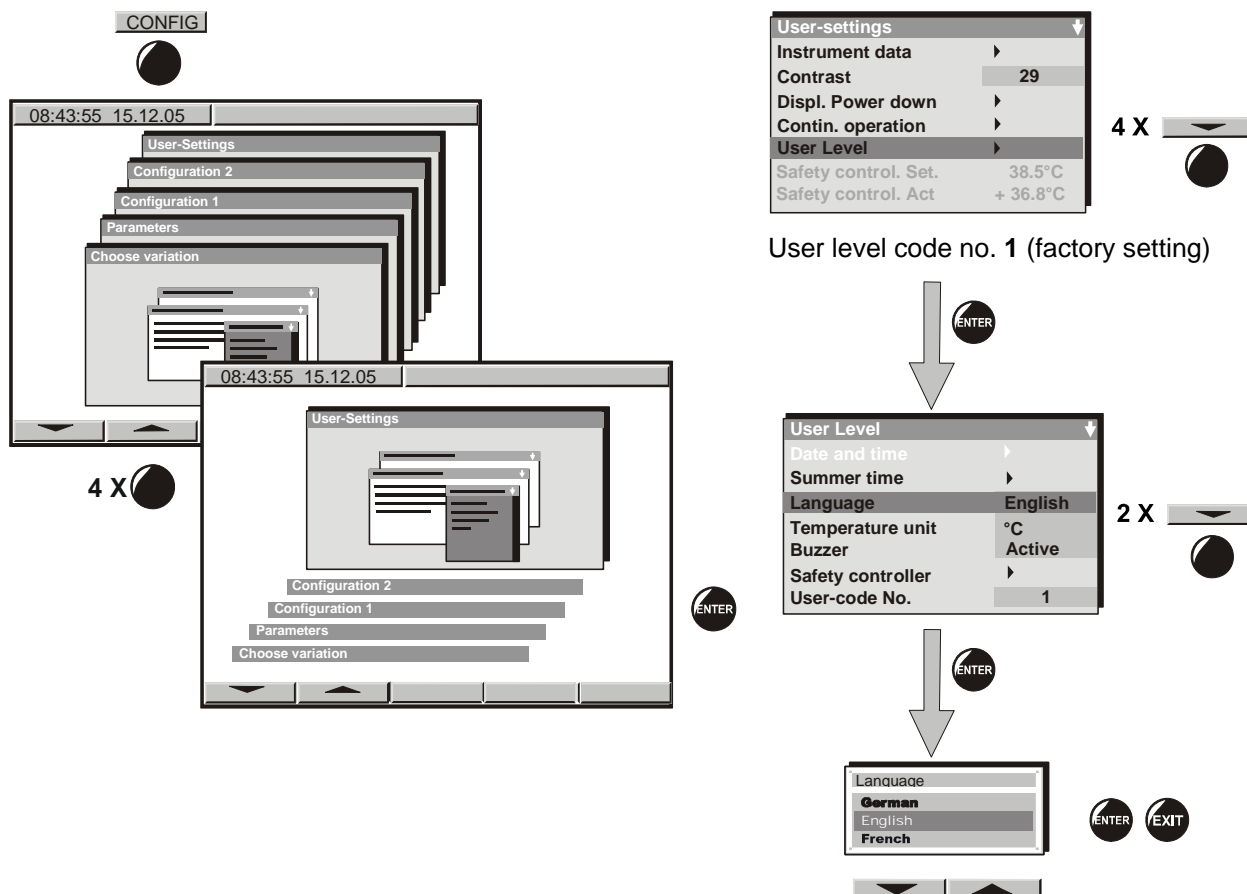


6. Settings of the controller MB1

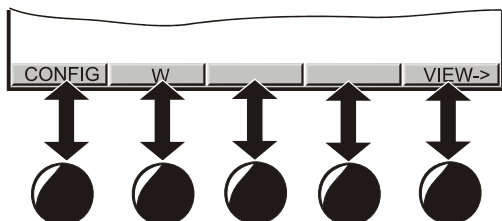
6.1 Selection of the menu language

The screen program controller MB1 controls the temperature and humidity inside the climatic chamber. The controller communicates by a plain language menu guide in German, English and French.

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



The row of buttons below the screen is context-sensitive. Button function is defined by the meaning shown above the buttons on the screen.



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 screens:

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

Button **VIEW->** allows toggling between the screens.

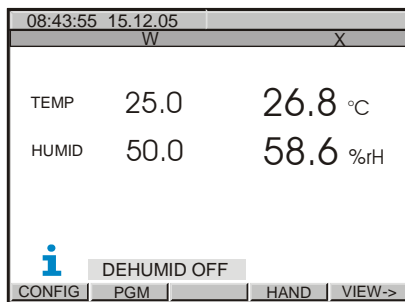
The **NORMAL DISPLAY** enables comparison of the current temperature and humidity (W) to the set-point values (X) or shows the fan working rate.

CONTACT PAGE

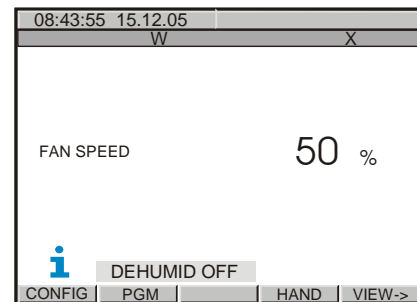


Contact the BINDER Service easily.

NORMAL DISPLAY Idle Mode

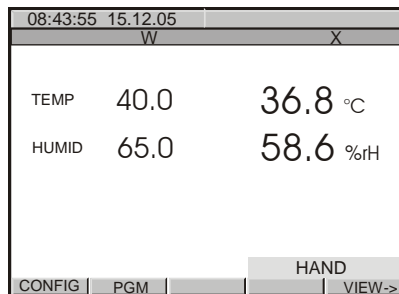


or



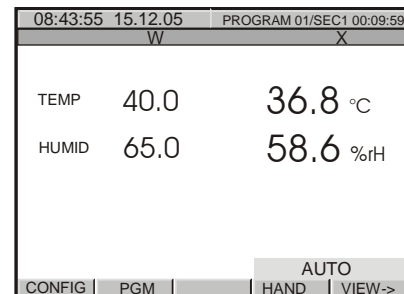
No heating or refrigeration, no humidification or dehumidification. The actual values (X) approximate ambient temperature and humidity. Fan working at 50% rate. Operation line 1 (dehumidification off) is ON.

NORMAL DISPLAY Manual Mode



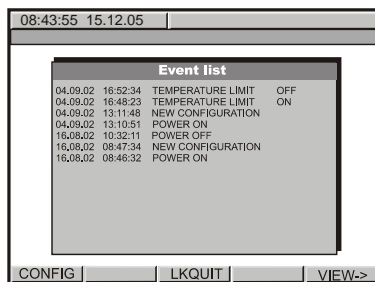
Temperature and humidity values are maintained according to the previous entered set-points (W).

NORMAL DISPLAY Program Mode



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

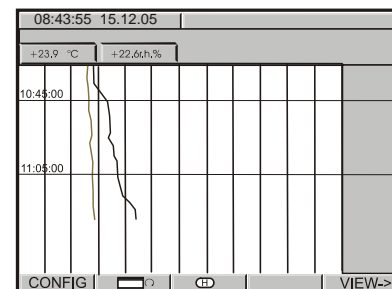
EVENT LIST



Time	Event Description	Status
04.09.02 16:52:34	TEMPERATURE LIMIT	OFF
04.09.02 16:48:23	TEMPERATURE LIMIT	ON
04.09.02 13:11:48	NEW CONFIGURATION	
04.09.02 13:10:51	POWER ON	
16.08.02 10:32:11	POWER OFF	
16.08.02 08:47:34	NEW CONFIGURATION	
16.08.02 08:46:32	POWER ON	

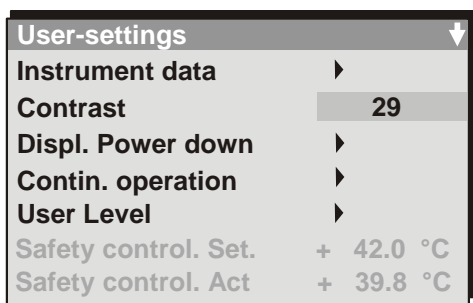
An overview over the last 16 events or error conditions of the unit is displayed.

CHART RECORDER FUNCTION



Graphical display of the current temperature and humidity data, offering to review the previous measurements on a history screen. A memory interval of 5s corresponds to a supervision period of 2.5 days.

6.3 Settings in the menu “User-settings”



Instrument data

- **Instrument Name**

Enter an individual name of the climatic 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:

Adjust the contrast of the screen according to the ambient light situation to obtain maximum readability.

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 switched 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 screen activity. Outside the defined period, the screen is automatically switched off. Pressing down any key reactivates the screen. After the time set in menu “Displ. power down“, the screen is switched off again as far as the actual time is not within the operation time fixed in menu “Cont. operation“.

User Level

Toggle here to 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 menu “User Level”.

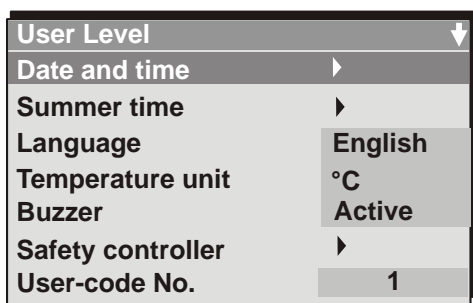
Safety control.Set

The setting of the tolerance limit of the safety controller (chap. 10.2) is displayed. You cannot change it here.

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 Settings in the menu “User Level”



Date and time

Enter the actual date and time to provide the measurement records with the correct relation of time. Data are displayed in the chart recorder function (chap. 7) of the controller and remain stored during power failure.

Summer time

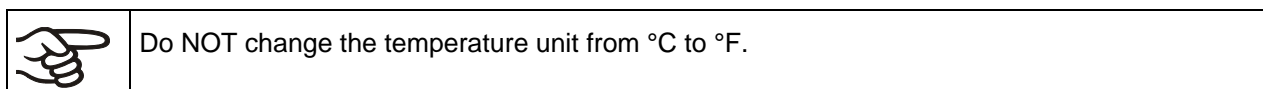
Time is set one hour in advance during the summer time period.

- **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



Buzzer

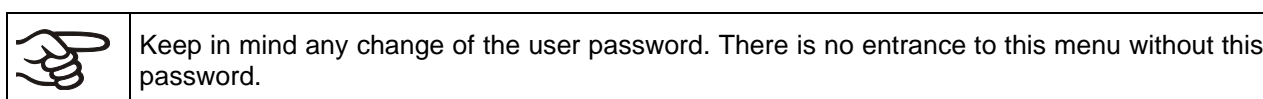
- **Inactive:** No acoustic alarm in case of alarm events (chap. 11).
- **Active:** Acoustic alarm in case of alarm events (chap. 11).

Safety controller

Enter a safety controller tolerance limit for temperature exceeding. For setting, see chap. 10.2.

User-Code No.

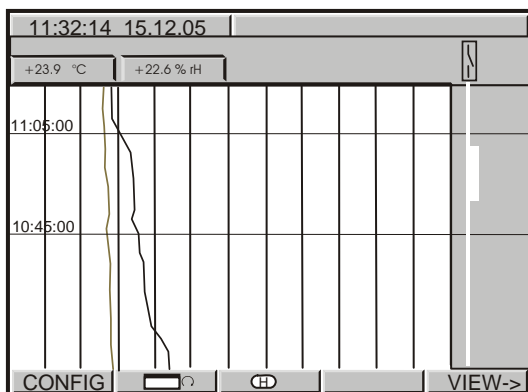
Change the password (“user code”) needed to access the menu “User settings”. Factory default setting +00001.



7. Graphical representation of the measurement course (chart recorder function)

This way of data representation imitates a chart recorder and allows recalling any set of measured data of any point of time out of 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:

Temperature: -10°C to 100°C

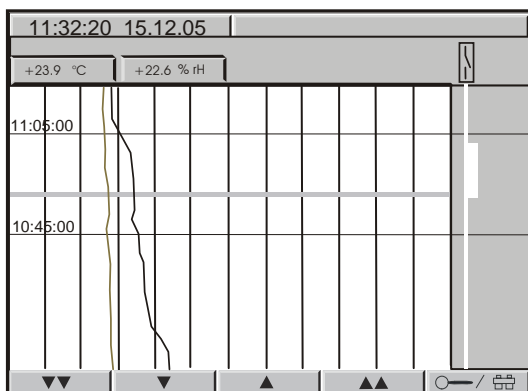
Humidity: 0% r.H. to 100% r.H.


If the dehumidification is switched-off, this is displayed on the right side as an enlarged line.

Button  allows toggling between different representations.

Depending on the selected kind of representation, button  might not have been visible until now.

History screen with cursor:



Select button  = History. A pink line appears on the screen marking as a cursor the selected instant. You can recall the recorded data of a certain instant.


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

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

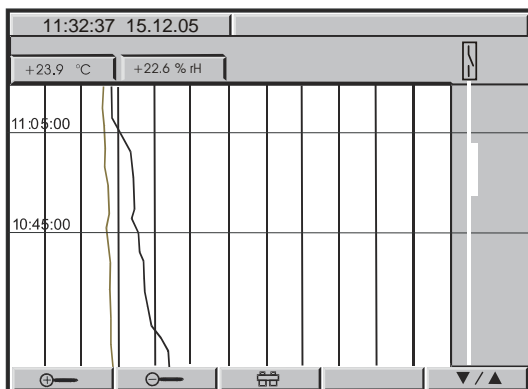
Scroll the cursor position using the arrow buttons.



Single arrow buttons: fine-tuning.


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

Switch to the zoom screen by pressing button  :

History - zoom function:

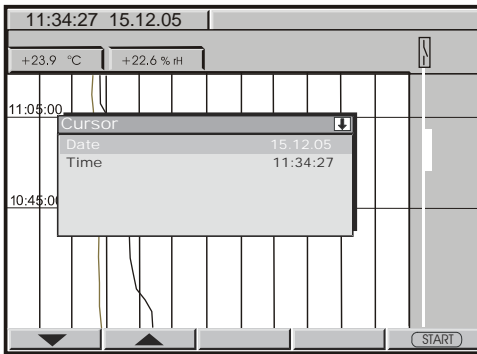


Magnifier buttons   : Zoom and zoom back (i.e., shorten or extend the displayed period).

Toggle back to the former representation screen using button .

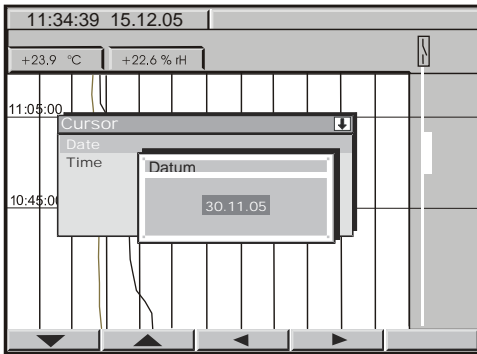
You can also directly enter any cursor position as a numerical input.

History representation: Toggling to any instant:



Press button . The window "Cursor position" opens to enter date and time.

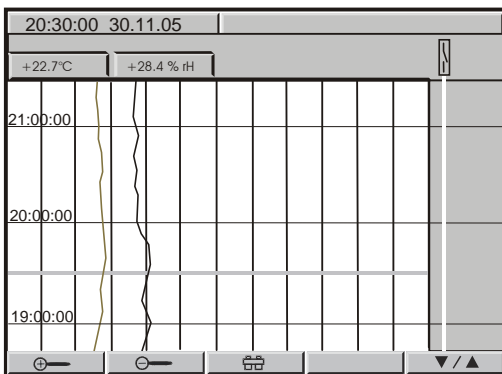
Select date or time with the arrow buttons and confirm with ENTER.



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

Press button .

History screen 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 instant are numerically and graphically displayed.

The cursor line marks the corresponding instant.

The possible presentation depends on the pre-selected storage rate. This means the higher the storage rate, the more precisely but also shorter the data representation will be. Following table shows this relation:

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



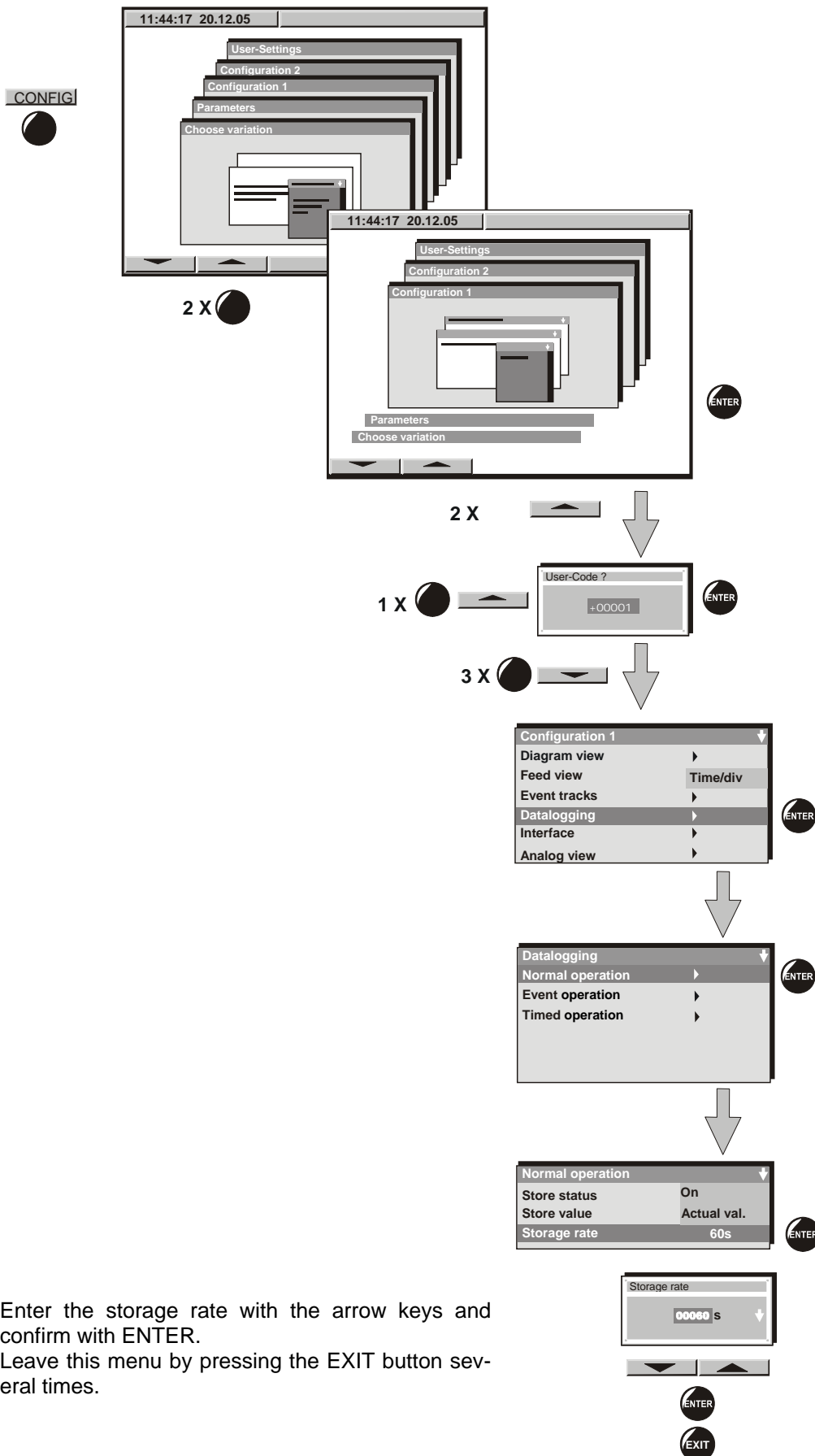
CAUTION

Setting the storage rate clears the measured-value memory.

Danger of information loss.

➤ Change the storage rate ONLY if the previously registered data are no more required.

7.1 Setting the storage rate

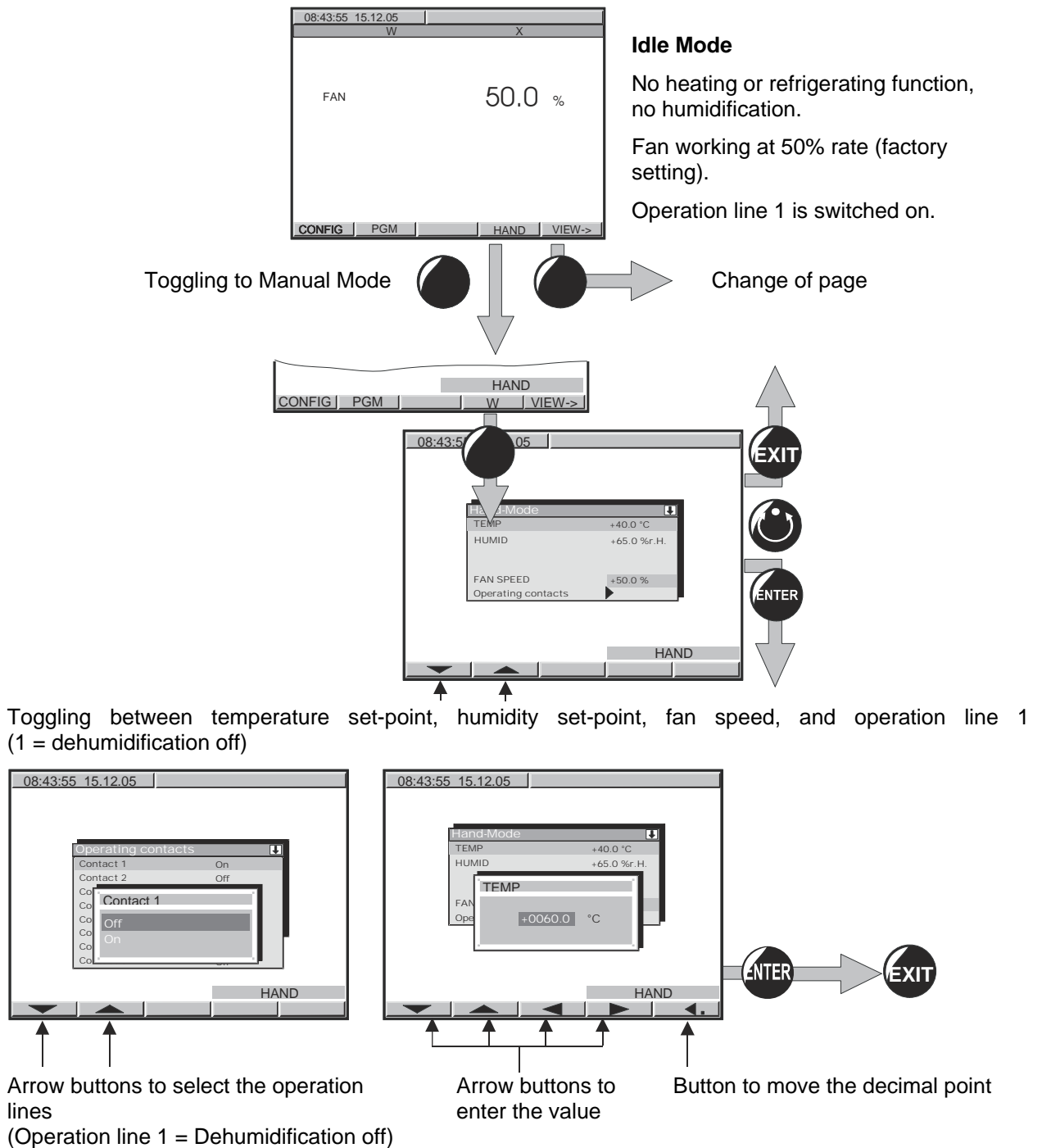


Enter the storage rate with the arrow keys and confirm with ENTER.
Leave this menu by pressing the EXIT button several times.

8. Manual Mode

In Manual Mode (HAND) you can enter a temperature set-point, a humidity set-point, the fan speed (0% to 100%), and the switching-state of up to 8 operation lines. Operation line 1 can be used to stop the dehumidification (chap. 12). The other operation lines are non-functional. All settings remain valid for Manual Mode (HAND) until the next manual change, also if the unit had been switched off or in case of toggling to Idle Mode or Program Mode (AUTO).


8.1 Set-point entry



Unlock the keyboard locking (option, chap. 14.5) via the key switch to enter the set-point.


Setting ranges:


Temperature	-10°C up to 100°C (Control ranges see technical data, chap. 19.4)
Humidity	0 % r.H. to 95 % r.H. For possible combinations of temperature and humidity values without condensation, see temperature / humidity diagram in chap. 12.
Fan speed	0 % to 100 % Fan speed can be reduced to standstill of the fan. Do this only if needed, because the spatial distribution of temperature and humidity is as well reduced. Technical data refer to 100% fan speed.


	<p>With set-point type "Limit", adapt the safety controller (chap. 10.2) or the temperature safety device class 3.3 (option, chap. 10.3) every time the set-point for temperature is changed. Set the safety controller set-point or the set-point of temperature safety device class 3.3 (option) about 2°C to 5°C above the controller temperature set-point.</p> <p>Recommended setting: Set-point type "Offset" with safety controller set-point 2°C.</p> <p>We recommend using the keyboard locking (option, chap. 14.5) during operation.</p>
---	---

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.

	<p>When incidentally pressing the EXIT or AUTOMATIC button during Manual Mode operation, the controller will change to Idle Mode and thus will not adjust any more to the program set-points.</p> <p>We recommend keyboard locking (option, chap. 14.5.) during operation.</p>
---	--

	<p>For a negative set-point entry, enter the numerical value first and only then the negative sign (-).</p>
---	---

	<p>When operating without humidity (humidity switch (3) 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).</p>
---	---

8.2 Behavior after power failure in Manual Mode

In Manual Mode (HAND), all functions reinstate exactly to the same situation the chamber had before power failure. The set-points are immediately resumed. The power failure is noted in the event list. No error message indicating that a power failure has taken place is displayed.

9. Program operation

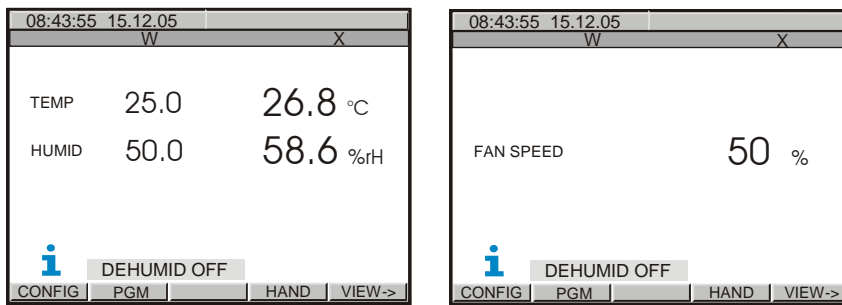
The 2-channel program controller MB1 allows to program temperature and humidity cycles. It offers 25 program memory positions with 100 program sections each. The total of program sections of all programs is limited to 500. It is not possible to link several programs.

For each program section a temperature set-point, a humidity set-point, the fan speed (0% to 100%), and the switching-state of up to 8 operation lines can be entered. Operation line 1 can be used to stop the dehumidification (chap. 12). The other operation lines are non-functional.

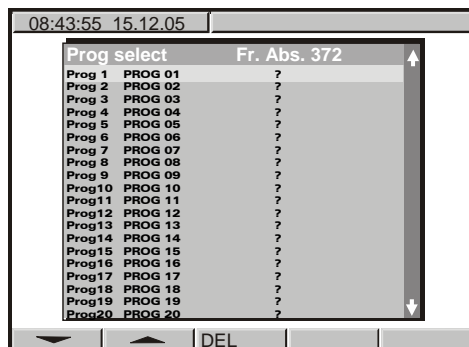
Programming is possible directly by the keypad of the controller or graphically by the software APT-COM™ 3 DataControlSystem (option, chap. 14.1) specially developed by BINDER.

9.1 Overview menu-based program entry

Screens showing the initial normal display in Idle Mode



Hit button PGM. The window **program selection** appears

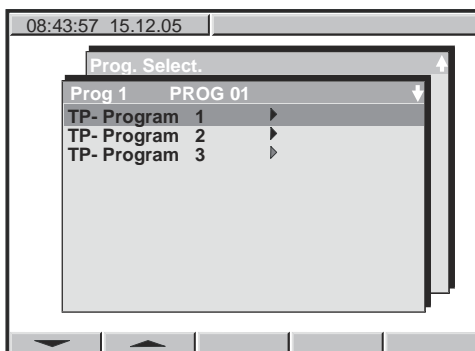


Select a program via the arrow keys and confirm by ENTER

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

TP-Program 1	Entry of temperature values and fan speed setting
TP-Program 2	Entry of humidity values
TP-Program 3	no function

9.2 Entry of temperature values and fan speed



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

An initially empty **program table** appears. You can now enter the temperature program.

Temperature at the beginning of the program section

Program No.

Subprogram TP-Program No. 1

Total number of program sections

Fan speed in %
Factory setting:
50% in Idle Mode
100% in Manual Mode and Program Mode

Parameter set (preselected)

Operation line 1 (dehumidification off)

Tolerance band limits temperature (maximum and minimum temperature)

Duration of program section

Number of start section in case of repeat cycles

Number of repeats in case of repeat cycles

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

Hit the PGM button. An inquiry screen appears offering 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. In a next step, values can be entered into these lines. It is as well possible to add supplementary lines later on or to delete individual lines at any moment.

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

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

Enter the individual values of the selected program section.

- Temperature at the start of the program section
- Fan speed in %
- Operating contact (operation line) 1 = Dehumidification OFF
- Duration of the program section
- No. of start section in case of repeat cycles
- No. of repeats in case of repeat cycles
- Temperature limits (maximum / minimum temperature)
- In case of exceeding: temporary program stop.**
- Pre-selected value (Do NOT change!)

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

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



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



With set-point type **“Limit”**, adapt the safety controller (chap. 10.2) or the temperature safety device class 3.3 (option, chap. 10.3) to the highest temperature set-point value of the program actually used. Check the safety device for each temperature program and adapt it if necessary. Set the safety controller set-point or the set-point of temperature safety device class 3.3 (option) about 2°C to 5°C above the controller temperature set-point.

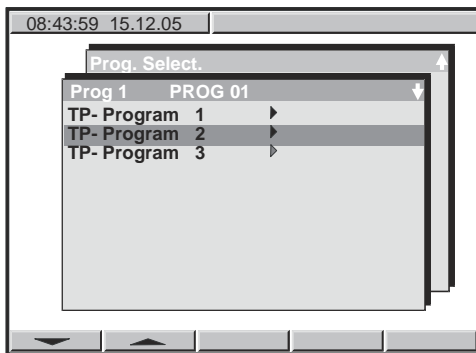
Recommended setting: Set-point type **“Offset”** with set-point 2°C.

Behavior after completing the program:

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

In order to avoid dehumidification of the charging material, operation line 1 (dehumidification off) is switched on. The fan turns at 50% rate.

9.3 Entry of humidity values



Select the second subroutine **“TP-Program 2”** and confirm with ENTER. An initially empty **program table** appears. You can now enter the humidity program.

Humidity at the beginning of the program section

Program No.

Subprogram TP-Program No. 2

Pgm-Editor		Pgm-Name		PROG 03		ZP-Prog-Nr		Abschn.		0	
No	W-l	FAN	Time	Sk	No	Cy	Tmin	Tmax	Pa		

Total number of program sections

Parameter set (preselected)

Fan speed in % (no function)

Operation line 1 (no function)

Tolerance band limits humidity (maximum and minimum humidity)

Duration of program section

Number of start section in case of repeat cycles

Number of repeats in case of repeat cycles

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

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 and 50% fan speed after ZP 1 is completed, no humidification after ZP 2 is completed). When the whole program is finished, the controller changes to Idle Mode. Temperature and humidity proceed towards ambient values.

If two subprograms of different duration are running, switching off the dehumidification (via operation line 1 = ON) can be useful. If the temperature subprogram (TP-program 1) is of longer duration than the humidity subprogram (TP-program 2), dehumidification of the charging material during heating operation after run-down of TP-program 2 can be prevented by inactivating the dehumidification for the remaining time after run-down of TP-program 2 via operation line 1.

Behavior after completing the program:

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

In order to avoid dehumidification of the charging material, operation line 1 (dehumidification OFF) is switched on. The fan turns at 50% rate.

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 following program section.

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

- **Gradual temperature / humidity changes “set-point ramp”**

The set-point gradually moves from one set-point to the one of the following program section during a given interval. The actual temperature or humidity value (X) follows the continually moving set-point (W) at any moment.

- **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 in the possible minimum time.

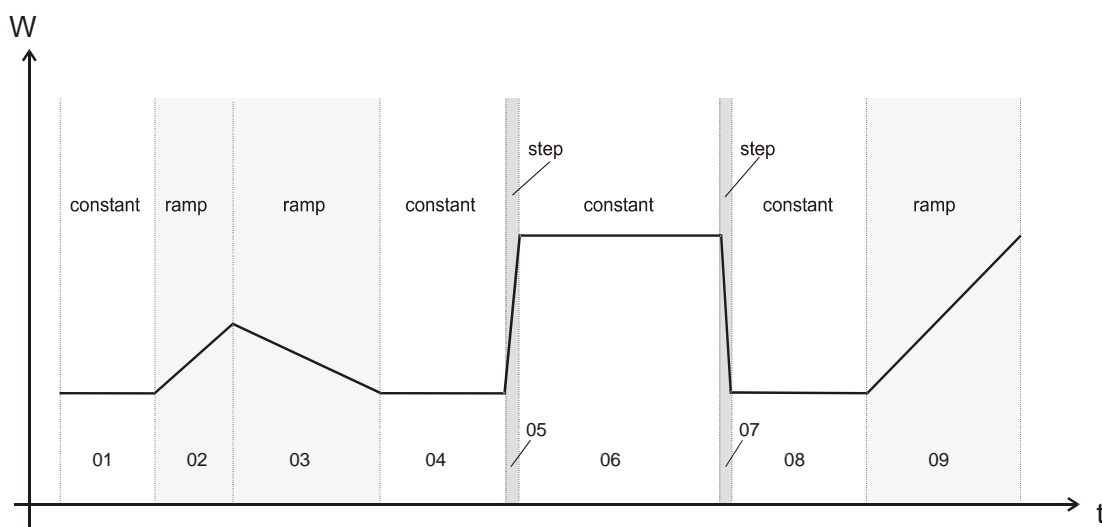


Figure 10: Possible temperature or humidity transitions

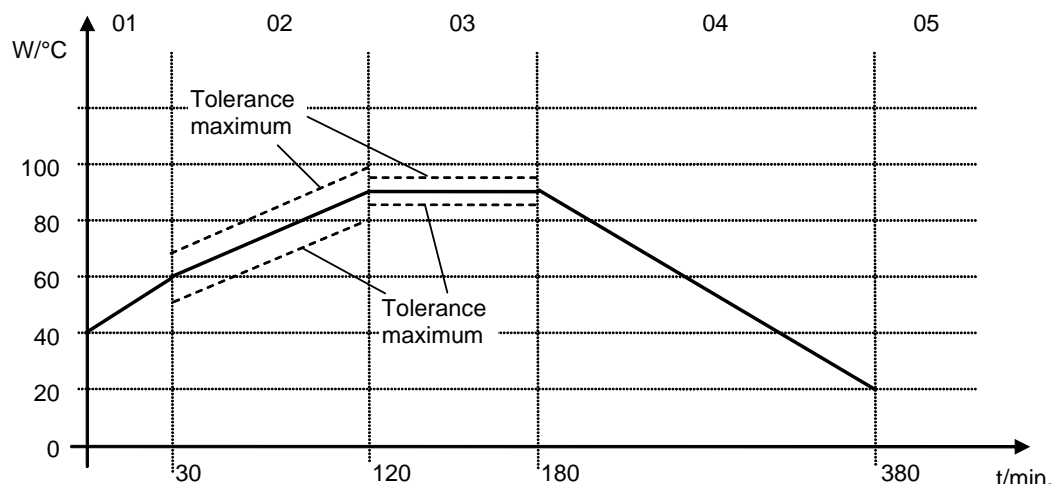
The following chapter offers examples of programming a set-point ramp and a set-point step.

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

In order to avoid incorrect programming, we recommend plotting the temperature profile and the humidity profile (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 stop the dehumidification (chap. 12). The other operation lines are non-functional.

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



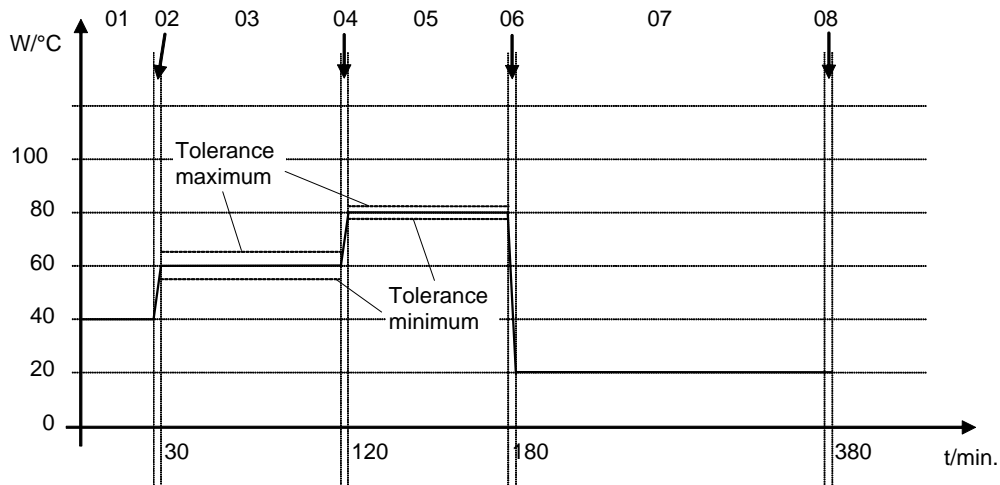
Program table corresponding to the diagram above:

Program section	Set-point temp.	Fan	Section time	Operation line1	Target section	No. of cycles	Min. tolerance	Max. tolerance
01	40	100 %	00:30:00	Off	1	0	-1999	+9999
02	60	100 %	01:30:00	Off	1	0	-5	+5
03	90	100 %	01:00:00	Off	1	0	-2	+2
04	90	100 %	03:20:00	Off	1	0	-1999	+9999
05	20	100 %	00:00:01	Off	1	0	-1999	+9999

Enter now the values of the above program table into the program table of one of the 25 program places of the program controller MB1:

08:43:55 15.12.05																										
Pgm-Editor			Pgm-Name											PROG 03												
Pgm-Nr			3											ZP-Prog-Nr			1			Abschn.				5		
No	W-1	FAN	Time	Sk	No	Cy	Tmin	Tmax	Pa																	
1	40.0	****.	00:30:00	00000000	1	0	-1999	+9999	1																	
2	60.0	****.	01:30:00	00000000	1	0	- 5	+ 5	1																	
3	90.0	****.	01:00:00	00000000	1	0	- 2	+ 2	1																	
4	90.0	****.	03:20:00	00000000	1	0	-1999	+9999	1																	
5	20.0	****.	00:00:01	00000000	1	0	-1999	+9999	1																	
										PGM																

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



Program table corresponding to the diagram above:

Program section	Set-point temp.	Fan	Section time	Operation line1	Target section	No. of cycles	Min. tolerance	Max. tolerance
01	40	100 %	00:30:00	Off	1	0	-1999	+9999
02	40	100 %	00:00:01	Off	1	0	-1999	+9999
03	60	100 %	01:30:00	Off	1	0	-5	+5
04	60	100 %	00:00:01	Off	1	0	-1999	+9999
05	80	100 %	01:00:00	Off	1	0	-2	+2
06	80	100 %	00:00:01	Off	1	0	-1999	+9999
07	20	100 %	03:20:00	Off	1	0	-1999	+9999
08	20	100 %	00:00:01	Off	1	0	-1999	+9999

Enter now the values of the above program table into the program table of one of the 25 program places of the program controller MB1:

08:43:55 15.12.05									
Pgm-Editor		Pgm-Name		PROG 03					
Pgm-Nr		3		ZP-Prog-Nr		1		Abschn. 5	
No	W-1	FAN	Time	Sk	No	Cy	Tmin	Tmax	Pa
1	40.0	****.	00:30:00	00000000	1	0	-1999	+9999	1
2	40.0	****.	00:00:01	00000000	1	0	-1999	+9999	1
3	60.0	****.	01:30:00	00000000	1	0	- 5	+ 5	1
4	60.0	****.	00:00:01	00000000	1	0	-1999	+9999	1
5	80.0	****.	01:00:00	00000000	1	0	- 2	+ 2	1
6	80.0	****.	00:00:01	00000000	1	0	-1999	+9999	1
7	20.0	****.	03:20:00	00000000	1	0	-1999	+9999	1
8	20.0	****.	00:00:01	00000000	1	0	-1999	+9999	1
PGM									



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

9.6 Advice for the programming of the 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.
- When operating without humidity (humidity switch (3) OFF), enter a humidity sub-program with the humidity set-point set to 0 in order to avoid alarms (in case of the humidity deviating by more than +/- 5% from the set-point).
- 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 program interruption, the screen displays at the right below AUTO HAND 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 is automatically continued. The indication AUTOHAND disappears.



Programming of tolerances can extend program duration.

Therefore, the duration of the program might 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 time course 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 allow the maximum heating, refrigerating, or humidification speed.

- The initial setting ****.* of the fan speed corresponds to the maximal speed of 100 %.



Do reduce the fan speed rate ONLY if absolutely necessary for the essay. Usually, the spatial exactitude of temperature and of humidity decreases with decreasing ventilation. Technical data refer to a 100 % fan speed rate.

- Programming is conserved even in case of power failure or after switching off the unit.
- The controller memory can store a maximum of 25 programs. Each program cannot exceed 100 sections. It is not possible to link several programs. The total number of program sections of all programs is limited to a maximum of 500.



If you incidentally press the EXIT or AUTOMATIC button during program operation, the controller will change to Idle Mode and thus will not adjust any more to the program set-points.

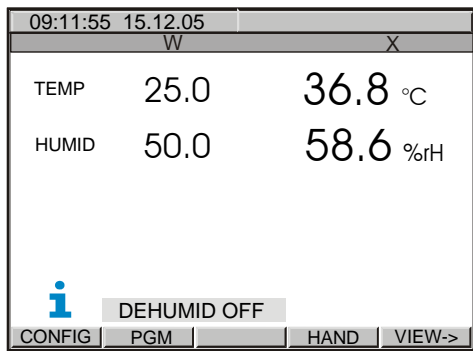
We recommend keyboard locking (option, chap. 14.5) during operation.

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 purpose only and the user must not modify them. Only service authorized by BINDER shall access those entries.

9.9 Starting a previously entered program

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



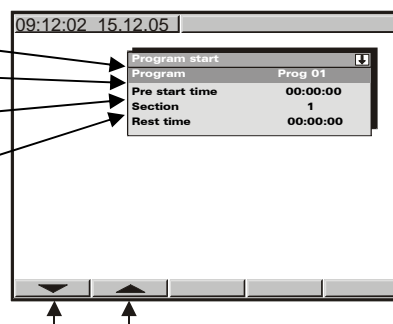
Idle mode

No heating or refrigerating function, no humidification.

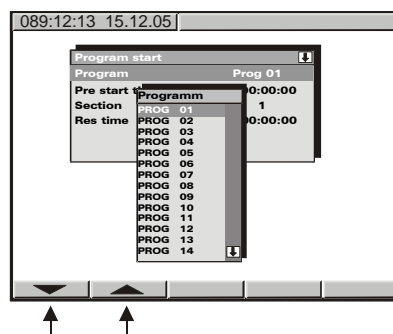
The fan turns at 50% rate (factory setting).

Operation line 1 is switched on.

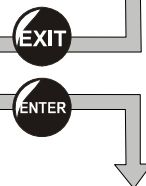
Select a program place
Delayed program start
Start with section ...
Remaining time of the selected start section



Arrow buttons to select the parameter to be set

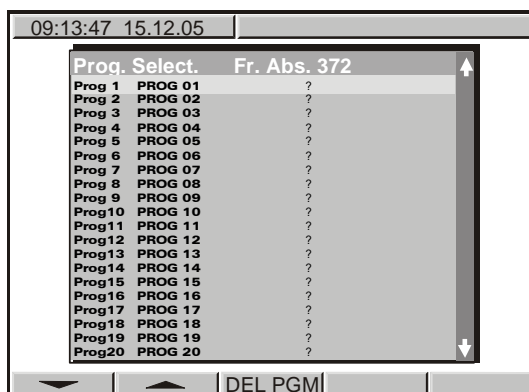


Arrow buttons to select the program



Hit **AUTOMATIC** key twice to start the program

9.10 Deleting a program



Select a program via the arrow keys

Hit button **DEL PGM** to delete the selected program.

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

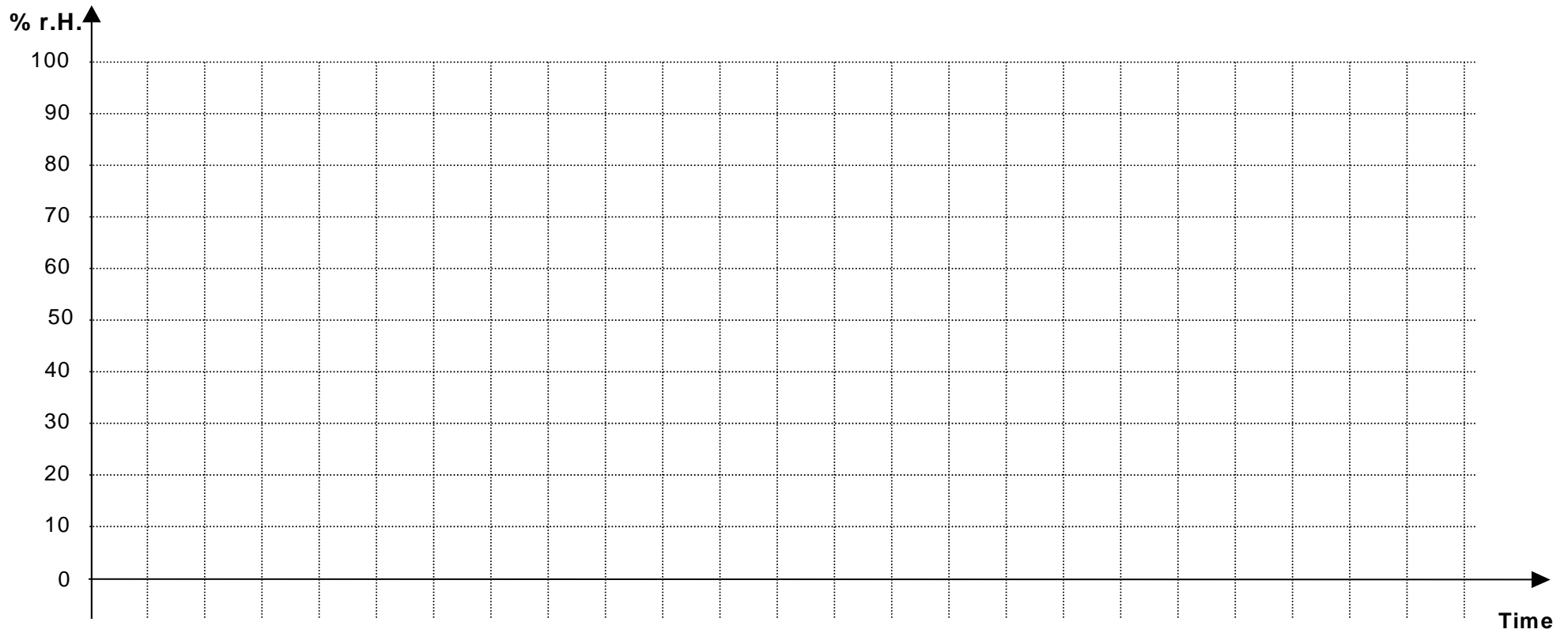
9.11 Temperature profile template

Programmer:		Program No. (1 to 25):	Date:
Program title:		Operation line 1 = dehumidification OFF	
Project:			



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 fan speed rate

Programmer:		Program No. (1 to 25):	Date:
Program title:		Operation line 1 = dehumidification OFF	
Project:			

Section No.	Set-point Temperature	Fan speed [%]	Section time	Operation line 1	Start section for repeat cycles	Number of re-peat cycles	Tolerance minimum Temperature Tmin	Tolerance maximum Temperature Tmax	Parameter set
	W-1	FAN	Time	Sk	No	Cy			Pa
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

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	Fan speed (no function)	Section time	Operation lines (no function) Sk	Start section for repeat cycles	Number of repeat cycles	Tolerance minimum Humidity Tmin	Tolerance maximum Humidity Tmax	Parameter set
	W-1	FAN	Time		No	Cy			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. Temperature safety devices


10.1 Over temperature protective device (class 1)

The climatic chamber is equipped with an internal temperature safety device, class 1 acc. to DIN 12880. It serves to protect the unit and prevents danger caused by considerable defects.


If a temperature of about 110°C is reached, the over temperature protective device permanently switches off the unit. The user cannot take the device into operation again. The protective cut-off device is located internally. Only a service specialist can replace it. In this case, please contact an authorized service or the BINDER Service.

10.2 Safety controller (temperature safety device class 3.1)

The climatic chamber is equipped with an over temperature safety device class 3.1 acc. to DIN 12880. It is called "safety controller". This second, electrically independent temperature controller takes over control at a selectable set point in case of a faulty condition. It serves to protect the charging material against extensive high temperatures.


	With the option safety device class 3.3 (chap. 10.3) the safety controller is not used. In this case, do NOT change the pre-set value of 100°C.
---	--

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

	<p>Regularly check the safety controller setting for set-point type "Limit" or "Offset"</p> <ul style="list-style-type: none"> - 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 <p>Set the safety controller set-point by about 2°C to 5°C above the desired temperature set-point.</p>
---	---

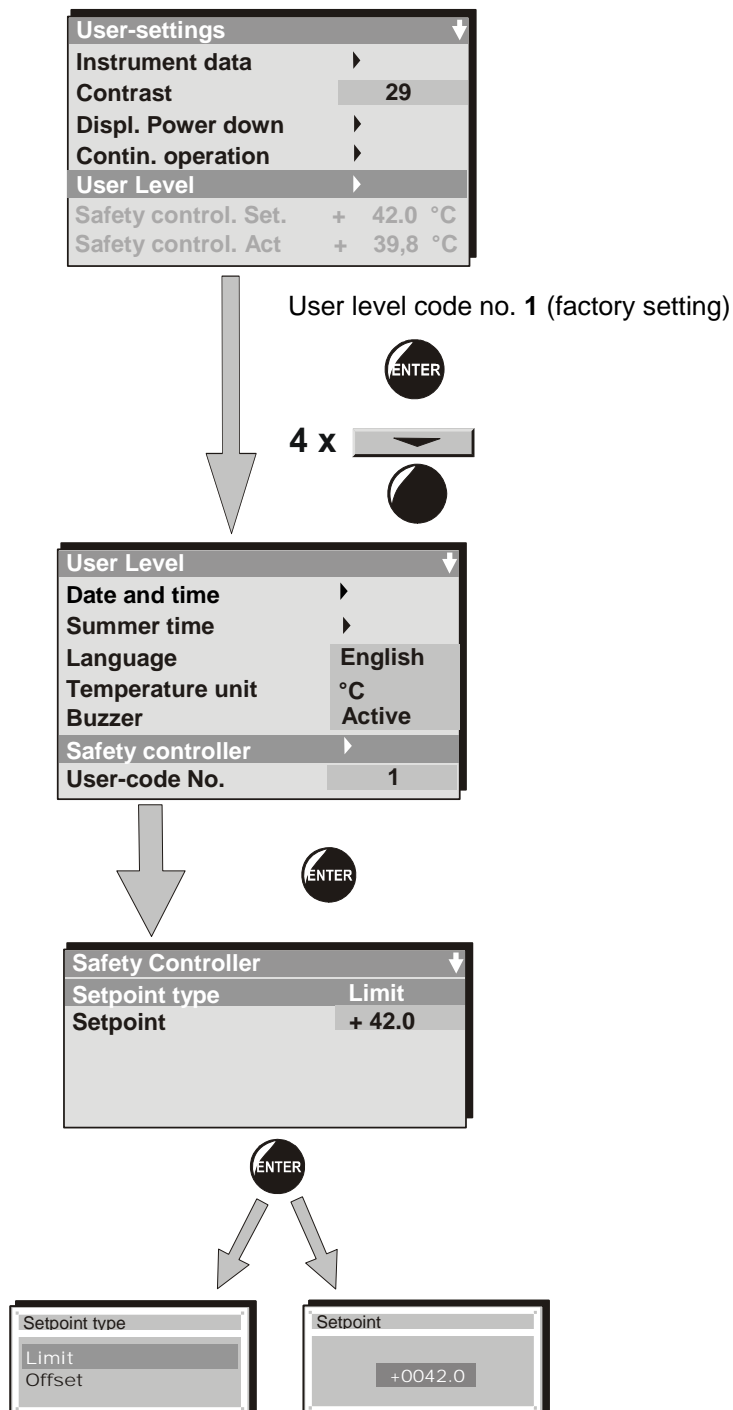
Safety controller set-point types:

Limit	<p>Absolute max. permitted temperature value</p> <p>Example: temperature set point 40°C, safety controller set-point 42°C</p>
Offset	<p>Maximum over temperature above any active temperature set point. (e.g., 2°C). The maximum temperature internally and automatically changes with every set-point change.</p>

	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. 14.5).



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. 14.5).

Regarding temperature disturbances see alarm indications, chap. 11.


10.3 Temperature safety device class 3.3 (DIN 12880) (option)

The temperature safety device, class 3.3, serves to protect the climatic chamber, its environment and the contents against forbidden temperature excesses.

Please also observe the regulations BGR 120 of the German professional association of the chemical industry (formerly ZH 1/119 laboratory guidelines of the employers' liability insurance association) (for Germany).

With this option, the unit is equipped with two additional temperature safety devices: Safety device class 3.1 for setting a maximum temperature, and safety device class 3.2 for setting a minimum temperature. The combination of the safety device class 3.1 and class 3.2 can be regarded as a safety device class 3.3. They are functionally and electrically independent of the temperature control system and assume the regulatory function if an error occurs.

Safety devices class 3.1 (6) and class 3.2 (7) are located in the lateral control panel.

 With option temperature safety device class 3.3, the safety controller (chap. 10.2) must be set to limit 100°C.

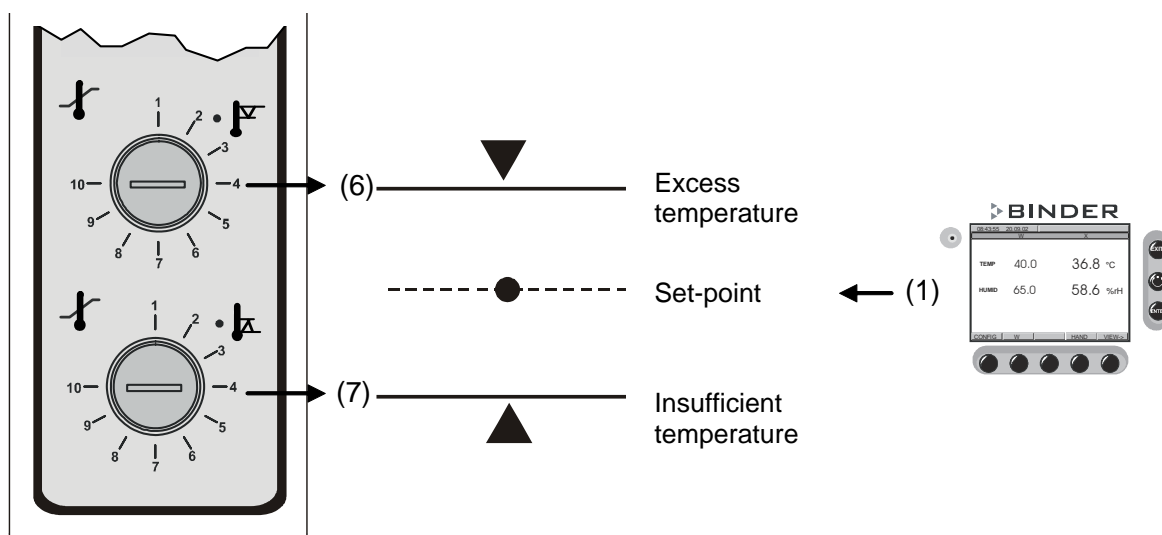
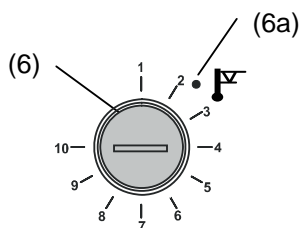


Figure 11: Temperature safety device class 3.3

Temperature safety device class 3.1



If you turn the control knob (6) to its end-stop (position 10), the safety device class 3.1 protects the appliance. If you set it to a temperature a little above the set-point temperature, it protects the charging material.

If the safety device class 3.1 has taken over control, identifiable by the red alarm lamp (6a) lighting up, proceed as follows:

- Disconnect the unit from the mains
- Have examined and rectified the cause of the fault by an expert
- Start up the unit again as described in chap. 5.

Adjustment:

To check the response temperature of the safety device, switch on the chamber and set the desired set point at the temperature controller.

The sections of the scale from 1 to 10 correspond to the temperature range from 0°C to 120°C and serve as a setting aid.

- Turn the control knob (6) of the safety device using a coin to its end-stop (position 10) (unit protection).
- When the set point is reached, turn back the control knob (6) until its trip point (turn it anti-clockwise).
- The trip point is identifiable by the red alarm lamp (6a).
- The optimum setting for the safety device is obtained by turning the control knob clockwise by approximately two scale divisions, which leads to extinguish the red alarm lamp (6a).

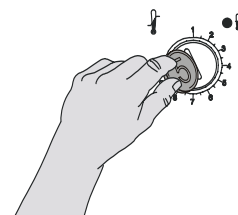
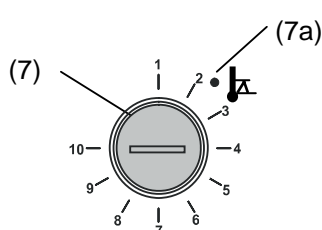


Figure 12: Setting safety device class 3.1



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

Temperature safety device class 3.2



The safety device class 3.2 is equivalently set to a minimum temperature the unit will not fall below. This protection against forbidden low temperatures can for example serve to protect sensitive cultures from cooling down too much.

If the control knob (7) is turned to its minimum (position 1), the safety device class 3.2 is without effect. If it is set to a temperature somewhat lower than that selected by means of the controller, it functions as a protective device for the material under treatment.

If the temperature safety device class 3.2 has assumed regulation, identifiable by the red alarm lamp (7a) lighting up, please proceed as follows:

- Disconnect the unit from the mains.
- Have examined and rectified the cause of the fault by an expert.
- Start up the unit again as described in chap. 5.

Adjustment:

To check the response temperature of the safety device, put the unit into operation and set the desired set point at the temperature controller.

The sections of the scale from 1 to 10 correspond to the temperature range from -40°C to +160°C and serves as a setting aid.

- Turn the control knob (7) of the safety device by means of a coin to position 1 (thermostat without effect).
- When the set point is reached, reset the safety device to its trip point (turn it clockwise).
- The trip point is identifiable by the red alarm lamp (7a).
- The optimum setting for the safety device is obtained by turning the control knob anti-clockwise by approximately two scale divisions, which leads to extinguish the red alarm lamp (7a).

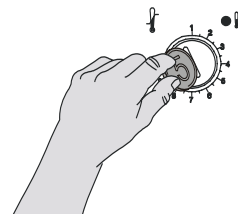


Figure 13: Setting safety device class 3.2



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

11. Notifying and alarm functions



11.1 Notifying and alarm system overview (auto diagnosis system)

The unit provides notification and alarm functions indicating messages in up to three steps:

1. Visual indication of notifying or error messages as blue notes on the screen of the controller MB1.
2. Visual indication of alarm messages as red notes with an alarm bell symbol. After a delay time, some notes change their color from blue to red.

Additionally there is an acoustic alert, provided that the buzzer has not been deactivated in menu "User level" (chap. 6.4).

3. Via zero-voltage relay outputs (option, chap. 11.3) the alarm can be transmitted e.g., to a central monitoring system.


Notifying sequence	1	2	3
Event	 Note (blue field)	 Alarm (red field)	Zero-voltage relay alarm outputs (option)
Temperature deviation of more than +/- 2°C of the entered set-point	TEMP RANGE immediately	TEMP RANGE after 16 Min.	after 16 min.
Humidity deviation of more than +/- 5 % r.H. of the entered set-point	HUMID RANGE immediately	HUMID RANGE after 16 min.	after 16 min.
Exceeded temperature limit of the safety controller		TEMPERATURE LIMIT immediately	
Dehumidification off (via operation line 1)	DEHUMID OFF immediately		
Power failure			immediately
With option temperature safety device class 3.3 (chap. 10.3):			
Exceeding the maximum temperature	TEMP HIGH immediately		
Exceeding the minimum temperature	TEMP LOW immediately		
With option locking of the keyboard (chap. 14.5):			
Locked keyboard	KEY LOCK immediately		


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


11.2 Resetting the notifying or alarm messages

The RESET button which is used to acknowledge and reset the indication appears automatically whenever a note or an alarm message comes up.

1. Remove the cause of the disturbance or wait that the unit compensates the reason of the error.
2. Hit the RESET button to reset the note or the alarm message.

	CAUTION
	<p>In case the RESET button does not cancel the notifying or alarm indication, the nature of disturbance was not removed correctly.</p> <p>➤ Contact the BINDER service.</p>

	<p>The RESET button allows resetting notifying or alarm messages regarding temperature and humidity only with in a tolerance sector of +/- 2°C resp. +/- 5 % r.H.</p> <ul style="list-style-type: none"> ➤ With values outside this range, contact the BINDER service.
---	---

	<p>If the humidity deviates by more than +/- 5 % r.H. from the set-point, this triggers an alarm message.</p> <p>In order to avoid such limit alarms when operating without humidity (humidity switch (3) OFF):</p> <ul style="list-style-type: none"> ➤ in Manual Mode set the humidity set-point to 0 % r.H. ➤ in Program Mode enter a humidity sub-program with the humidity set-points set to 0 % r.H.
---	--

11.3 Zero-voltage relay alarm outputs for temperature and humidity (option)

Equipment of the chamber with zero-voltage relay outputs for temperature and humidity (option) allows transmitting alarms to a central monitoring system. Connection is established via a DIN socket.

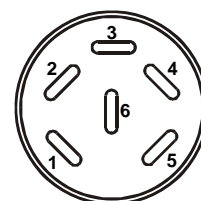
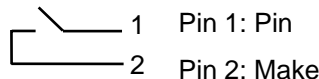




Figure 14: Pin configuration of the DIN socket

Temperature contact	Humidity contact
 <p>Pin 1: Pin Pin 2: Make</p>	 <p>Pin 3: Pin Pin 4: Make</p>

In case of a temperature alarm, pins 1 and 2 are open; with humidity alarm, pins 3 and 4 are open. This happens simultaneously to the alarm message displayed at the controller display.

In case of power failure, both contacts are open.


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

	 DANGER
<p>Electrical hazard.</p> <p>Danger of life.</p> <p>Damage of switching contacts and connection socket.</p> <ul style="list-style-type: none"> ⊘ Do NOT exceed the maximum switching load of 24V AC/DC – 2.5A. ⊘ Do NOT connect any devices with a higher loading capacity. 	

In case of temperature and humidity alarm, the alarm message at the controller display remains displayed during the alarm transmission via the zero-voltage relay outputs.


As soon as there is no more alarm cause, you can reset the alarm transmission via the zero-voltage relay outputs together with the alarm message at the controller display hitting the RESET key.

In case of power failure, alarm transmission via zero-voltage relay outputs remains active the whole duration of power failure. Afterwards, both contacts close automatically.

	<p>When using the communication software APT-COM™ 3 DataControlSystem (option, chap. 14.1) via the RS422 interface of the climatic chamber for data acquisition, the alarm is not automatically transmitted to the APT-COM™ protocol.</p> <ul style="list-style-type: none"> ➤ Set the tolerance limits for recording limit value excesses separately in APT-COM™.
---	---

12. Humidity system

The KBF / KBF-ICH climatic chamber is equipped with a capacitive humidity sensor. This results in a regulatory accuracy of up to $\pm 3\%$ r.H. of the set point. The temperature-humidity diagram for KBF (Figure 15) shows the possible working range for humidity. For KBF-ICH with illumination, see Figure 20.

	<p>The preset temperature and humidity values should be situated within the optimum range (hatched range in Figure 15). Only within this area can the unit will not be exposed to excessive moisture due to condensation.</p> <p>In the short-term set points outside the optimum range can also be targeted. The regulatory accuracies of $\pm 3\%$ r.H., however, cannot be guaranteed in this case.</p>
---	---

In order to obtain a control range of temperature and relative humidity values above 65°C and 65 % r.H., switch off the dehumidification – regularly running during humidity operation – via **operation line 1**:

0 = dehumidification running

1 = dehumidification Off

This switched-off state of the dehumidification is effective only during heating operation.

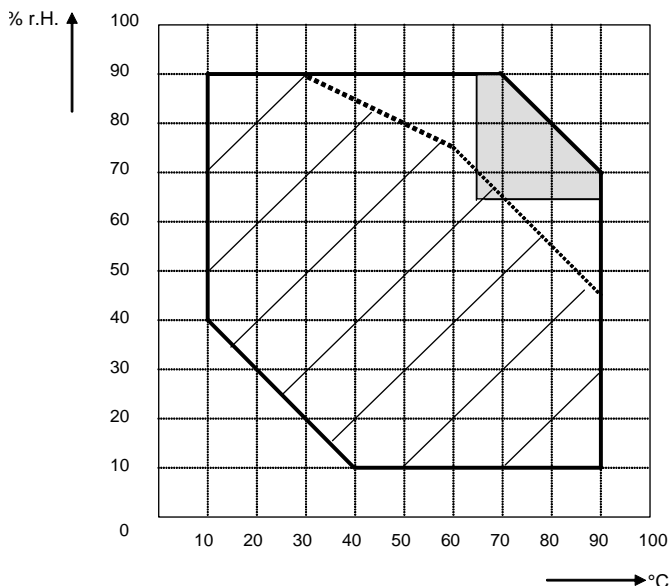




Figure 15: Temperature-Humidity diagram KBF

- Area inside the frame:
Control range of temperature and relative humidity.
- Hatched range:
Control range of temperature and relative humidity without condensation in the inner chamber.
- Gray range (over 65°C and 65 % r.H.):
Control range of temperature and relative humidity that can only be reached with dehumidification Off.

	<p>Heat emission of electrical devices connected inside the chamber may modify the temperature and humidity range.</p>
---	--

The KBF / KBF-ICH climatic chamber is equipped with a door heating system to prevent condensation in the door area.

If the set points for temperature or humidity are outside the optimum range, condensation can arise in the door area.

	<h3>CAUTION</h3>
	<p>Condensation by excess humidity.</p> <p>Danger of corrosion on the housing after operating at humidity values > 70 % r.H. for a long period.</p> <p>➤ Dry the appliance completely before shut-down:</p> <ul style="list-style-type: none"> – Set the humidity to 0 % r.H. and switch on humidity switch (3). – Set the temperature set point to 60°C for approx. 2 hours (Manual mode). – Only then, shut down the unit at the main switch (2).

If in program operation two subprograms of different duration are running we recommend switching off the dehumidification (operation line 1 = ON). If the temperature subprogram (TP-program 1) is of longer duration than the humidity subprogram (TP-program 2), dehumidification of the charging material during heating operation after run-down of TP-program 2 can be prevented by inactivating the dehumidification for the remaining time after run-down of TP-program 2 via operation line 1.

The humidifying system works to counteract permanent dehumidification, thus allowing precise regulation. The KBF / KBF-ICH climatic chamber dehumidifies continuously when the humidity switch (3) is switched on. In order to avoid dehumidification of the charging material after program rundown, dehumidification is switched off in Idle Mode via operation line 1 (blue notification DEHUMID OFF). Condensate formed by dehumidification is returned to the humidifying system.

The temporal humidity fluctuation in stable condition is ± 1.5 % r.H. Under certain conditions (e.g., door opening, water exchange in the steam cylinder, or switching between the evaporator plates) it can reach > 1.5 % r.H for 10 to 30 minutes max.

13. Defrosting at refrigerating operation

BINDER climatic chambers are very diffusion-proof. To ensure high temperature precision there is no automatic cyclic defrosting device. The DCT™ refrigerating system largely avoids icing of the evaporation plates. Nevertheless, the moisture in the air can condense on the evaporator plates leading to icing.


	Always close the door properly.
---	---------------------------------

Operation at temperatures $> +16^{\circ}\text{C}$:

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


Operation at temperatures $< 16^{\circ}\text{C}$:

The refrigerating system is continuously running, which results in stronger icing on the evaporator. High humidity enhances icing.

	<p>At temperatures $< 16^{\circ}\text{C}$ with high humidity ($> 60\%$ r.H.), regularly defrost the unit manually and let it pump off the water:</p> <ul style="list-style-type: none"> – Open the door if desired. (Advantage: shorter drying period. Disadvantage: elevated humidity in the immediate ambience) – Set the humidity to 0 % r.H. and switch on the humidifying system at switch (3). – Set the temperature to a value between 30°C to 40°C (Manual Mode). – Let the unit operate for about 30 minutes (door open) or for several hours (closed door).
---	---

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

When **changing from refrigerating operation to heating operation with humidity switch (3) off**, there is danger of overflowing due to uncontrolled defrosting of icing on the evaporator.

	CAUTION
	<p>Uncontrolled defrosting of icing on the evaporator. Danger of overflowing.</p> <p>After several days of refrigerating operation $< 16^{\circ}\text{C}$ with humidity switch (3) off:</p> <ul style="list-style-type: none"> ⊘ Do NOT directly switch off the unit (it would approximate ambient temperature). ⊘ Do NOT directly operate the unit in heating operation with humidity switch (3) off. ➤ Manually defrost the unit and let it pump off the water (see description above).

14. Options

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

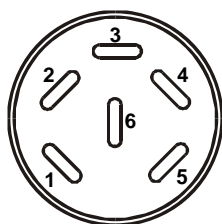
The climatic chamber is regularly equipped with a serial interface RS 422 to which the BINDER communication software APT-COM™ 3 DataControlSystem can be connected. In adjustable intervals, the actual temperature and humidity values are put out. Programming can be performed graphically via PC. Up to 30 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™.

Pin allocation of the RS 422 interface:	pin 2:	RxD (+)
	pin 3:	TxD (+)
	pin 4:	RxD (-)
	pin 5:	TxD (-)
	pin 7:	Ground

14.2 Analog outputs for temperature and humidity (option)

With this option the chamber is equipped with analog outputs 4-20 mA for temperature and humidity. These outputs allow transmitting data to external data registration systems or devices.

The connection is carried out as a DIN socket at the rear of the chamber as following:



ANALOG OUTPUT 4-20 mA DC

PIN 1: Temperature –
 PIN 2: Temperature +
 PIN 3: Humidity –
 PIN 4: Humidity +

Humidity range: 0 % r.H. to 100 % r.H.
 Temperature range: -10°C to +100°C

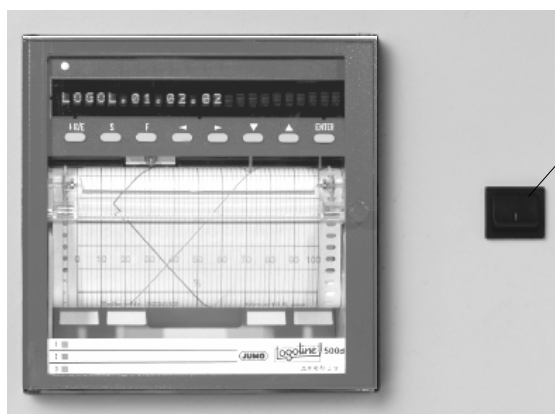
A suitable DIN plug is enclosed.

Figure 16: Pin allocation of DIN socket for option analog outputs

14.3 Two-channel-recorder (option)

Optional equipment of the KBF / KBF-ICH climatic chamber with a two-channel-recorder allows simultaneously recording the current humidity value (channel 1) and temperature value (channel 2). In addition, it documents date and time. This built-in two-channel-recorder is located in the center of the humidity module.

Use switch (9) to switch on or off the recorder. For further information, please refer to the enclosed two-channel-recorder operating manual.



Channel 1: Humidity 0% r.H. up to 100% r.H.
 Channel 2: Temperature -10°C up to +100°C

Figure 17: Two-channel-recorder



14.4 Water protected internal socket (option)


The internal socket is splash proof.


IP system of protection 65 230 V 1N ~ 50-60 Hz

Charge max. 500 W

Maximum permitted operating temperature with this option: 50°C.

	 WARNING
	<p>Exceeding of the permitted maximum temperature.</p> <p>Electrical hazard.</p> <p>Danger of life.</p> <p>Damage of the internal socket.</p> <ul style="list-style-type: none"> ⊘ Do NOT exceed the temperature set-point of 50°C. ➤ Set the safety controller to 50°C. ➤ With optional temperature safety device, class 3.3, set the mechanical thermostat class 3.1 to 50°C.

	<p>Heat emission of electrical devices connected inside the chamber may modify the temperature and humidity range.</p>
---	--

	CAUTION
	<p>Risk of short circuit.</p> <p>Damage of the unit.</p> <ul style="list-style-type: none"> ➤ Use delivered plug only (IP protection type 66). Plug-in the plug and turn it to secure. ➤ If the socket is not used, close the lift-up lid and turn it for securing.

14.5 Keyboard locking (option)

The keyboard of the MB1 controller can be locked and unlocked via the key switch (option). In locked state, no entries to the controller are possible.

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

Only when the keyboard is locked, the key can be removed.

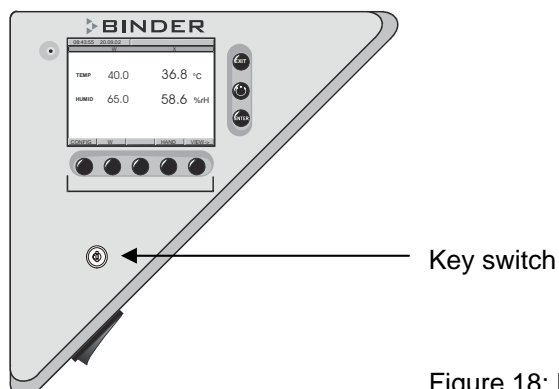


Figure 18: Keyboard locking (option)

If the keyboard is locked, the notification "KEY LOCK" is displayed on the controller MB1 screen (chap. 11).

15. ICH compliant illumination according to CPMP/ICH/279/95 (Q1B)

The combination of fluorescent tubes with light colors 640 (cool white) and 09 (UVA) leads to a spectral distribution according to option 2 of guideline CPMP/ICH/279/95 (Q1B).

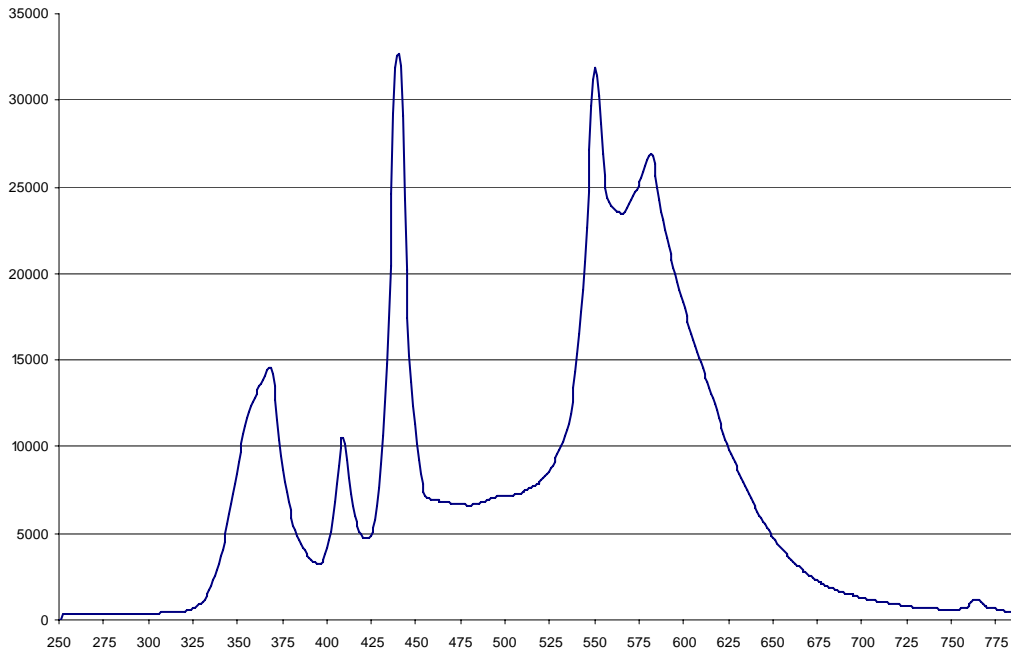


Figure 19: Overall spectrum cool white light color 640 and UVA light color 09

The waste heat of the fluorescent tubes leads to a modification of the temperature - humidity diagram:

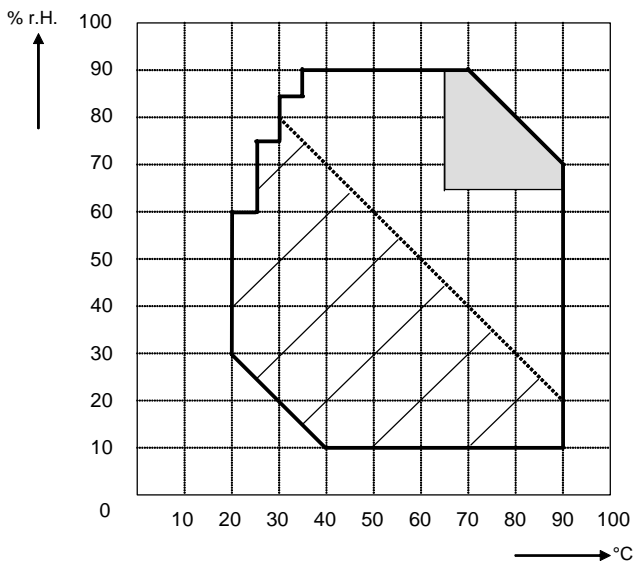




Figure 20:
Temperature - humidity diagram KBF-ICH with illumination

- Area inside the frame:
Control range of temperature and relative humidity
- Hatched range:
Control range of temperature and relative humidity without condensation
- Gray range (over 65°C and 65 % r.H.):
Control range of temperature and relative humidity that can only be reached with dehumidification OFF (chap. 12)

	 WARNING
	<p>UV light hazard. Eye and skin injury.</p> <ul style="list-style-type: none"> ⊘ Do NOT look directly into the light. ➤ Minimize skin exposure.

UVA fluorescent tube: T8 fluorescent tube in form of a rod with a tube diameter of 26mm. Length according to chamber size 600mm or 1200mm. Emissive range in the UVA range 320 to 400 nm.

VIS fluorescent tube: T8 fluorescent tube in form of a rod with a tube diameter of 26mm. Length according to chamber size 600mm or 1200mm. Emissive range in the visible spectral range 400 to 800 nm. The relative spectral distribution meets the F6 standard (cool white) acc. to ISO 10977.

15.1 ICH compliant illumination in the chamber doors (KBF-ICH)

The KBF-ICH 240 and the KBF-ICH 720 are each equipped with 10 fluorescent tubes for UVA and the visible spectral range. The fluorescent tubes are located in the doors separated from the interior. Special reflector material in the doors ensures optimum light diffusion and efficient utilization of the high light intensity.

The fluorescent tubes are turned on by two additional switches (4a) and (4b) on the lateral control panel (switches in position "I"). This allows switching off the fluorescent tubes for UVA and visible spectral range independently from one another after having reached the target intensity of guideline CPMP/ICH/279/95 (Q1B).

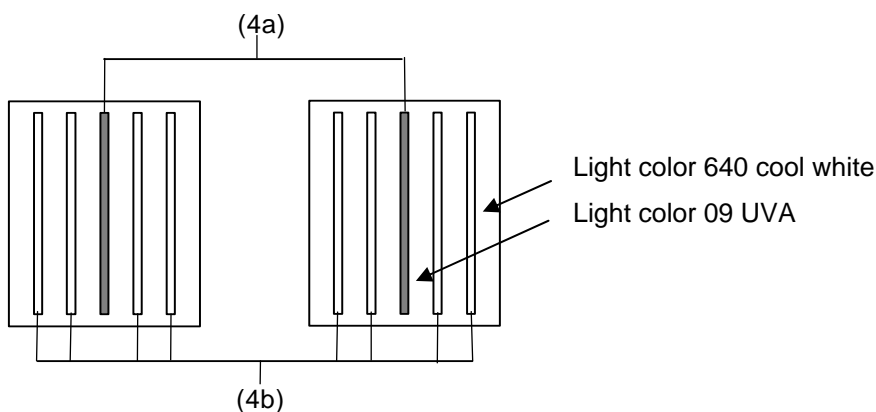


Figure 21: Arrangement of the fluorescent tubes inside both of the chamber doors

- (4a) Switch for ICH illumination light color 09 UVA in the unit doors
- (4b) Switch for ICH illumination light color 640 cool white in the unit doors



When operating the chamber with illumination: Restricted temperature and humidity range 20°C to 90°C, at 20°C not below 30 % r.H.

15.2 ICH compliant illumination under the ceiling (option)

With this option for KBF 240 / KBF-ICH 240 and KBF 720 / KBF-ICH 720, the unit is equipped with 6 resp. 8 fluorescent tubes for UVA and the visible spectral range. The fluorescent tubes are located under the ceiling separated from the interior, with thermal decoupling and aeration. Special reflector material ensures optimum light diffusion and efficient utilization of the high light intensity.

The fluorescent tubes are turned on by two additional switches (5a) and (5b) on the lateral control panel (switches in position "I"). This allows switching off the fluorescent tubes for UVA and visible spectral range independently from one another after having reached the target intensity of guideline CPMP/ICH/279/95.

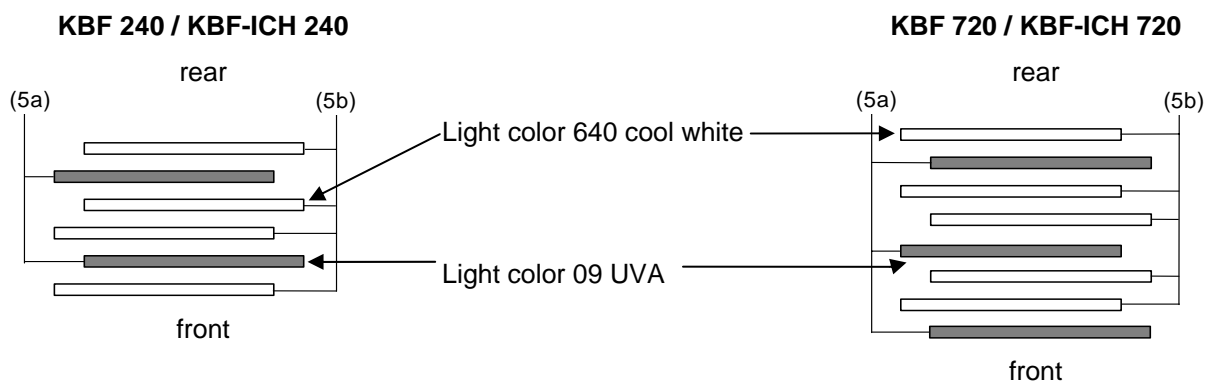


Figure 22: Arrangement of the fluorescent tubes under the ceiling

- (5a) Switch for ICH illumination light color 09 UVA under the ceiling
- (5b) Switch for ICH illumination light color 640 cool white under the ceiling

	When operating the chamber with illumination: Restricted temperature and humidity range 20°C to 90°C, at 20°C not below 30 % r.H.
--	---

16. Maintenance, cleaning, and service

16.1 Maintenance intervals, service

	DANGER
	<p>Electrical hazard.</p> <p>Danger of life.</p> <ul style="list-style-type: none"> Ø The unit must NOT become wet during operation or maintenance works. ➤ Put off-circuit the unit before conducting maintenance work. Pull the power plug. ➤ Have all maintenance work conducted by professional electricians or experts authorized by BINDER.

Have conducted regular maintenance work at least once a year.

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.

The first maintenance should be performed after operating for about 20 weeks if the water quality is normal. Deviating water quality can lengthen or shorten the interval.

	The electrodes are subject to normal operational wear and can be replaced. Their lifetime depends on the aggressiveness of the water available and the number of hours of operation.
--	--

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

	Change the door gasket in cold condition only. Otherwise the door gasket will be damaged.
--	---



Change the filter cap of the humidity sensor at least once a year and adjust the humidity sensor. Regular filter changes increase the lifetime of the humidity sensor by 3 to 5 times.

We recommend entering a maintenance agreement. Please consult the BINDER service department.

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: +1 866 816 8191 (toll-free in the USA)
 BINDER Asia Pacific: + 603 6204 2855
 BINDER Internet homepage: <http://www.binder-world.com>
 BINDER address: BINDER GmbH, post office box 102, D-78502 Tuttlingen

International customers, please contact your local BINDER distributor.

16.2 Replacement of the fluorescent tubes

The average life expectancy of the fluorescent tubes is about 10,000 hours. We recommend replacing the tubes every year in order to ensure full light intensity.




In the doors (KBF-ICH):

To replace the fluorescent tubes, remove the clamping strip resting against the glass plate. Then lift the plate from the inner door. Rotate the tubes themselves by 90°. Finally, press the tubes lightly upwards or downwards and simultaneously pull them toward the front.

Under the ceiling (option):

To replace the fluorescent tubes, unscrew and remove the cover plate of the illumination under the ceiling. Lift the glass pane and completely pull it out toward the front. Then turn the fluorescent tubes by 90° and pull them out of their holders.

16.3 Cleaning and decontamination


 	 DANGER
	<p>Electrical hazard.</p> <p>Danger of life.</p> <ul style="list-style-type: none"> Ø Do NOT spill water or cleaning agents over the inner and outer surfaces. ➤ Put off-circuit the unit before cleaning. Pull the power plug. ➤ Completely dry the appliance before switching it on again.

Cleaning

Disconnect the chamber from the mains before cleaning. Pull the power plug!

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 Halogenide. Alcoholic solutions. We recommend using the neutral cleaning agent Art. No. 1002-0016.
Instrument panel	Standard commercial cleaning detergents free from acid or Halogenide. We recommend using the neutral cleaning agent Art. No. 1002-0016.

	<p>For surface protection, perform cleaning as fast as possible. After cleaning completely remove cleaning agents from the surfaces with a moistened towel.</p>
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Decontamination

Disconnect the chamber from the mains prior to decontamination. Pull the power plug.

You can use the following disinfectants:


Inner chamber	<p>Standard commercial surface disinfectants free from acid or Halogenide. Alcoholic solutions. We recommend using disinfectant Art. No. 1002-0022.</p>
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In case of impurity of the interior with biological or chemical hazardous goods, there are two possible procedures depending on the type of contamination and of the charging material.


(1) Spray the inner chamber with an appropriate disinfectant.

Before start-up, the unit must be absolute dry and ventilated, because explosive gases might 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.

	<p>With every decontamination method, ensure adequate personal safety.</p>
---	--

	<h2>CAUTION</h2>
	<p>Danger of corrosion. Damage of the unit. ∅ Do NOT use acidic or chlorine cleaning detergents.</p>


	<p>We recommend using the neutral cleaning agent Art. No. Art. Nr. 1002-0016 for a thorough and mild cleaning. Any corrosive damage that might arise following use of other cleaning agents is excluded from liability by the BINDER GmbH.</p>
---	--

16.4 Sending back the unit to the BINDER GmbH

Should you send a BINDER product to us for repair or any other reasons, we shall only accept the BINDER product upon presentation of a so-called authorization number that has previously been issued to you. We shall issue the authorization number after receiving your complaint in writing or via telephone prior to your sending (back) the BINDER product to us. The authorization number will be issued following the receipt of the information mentioned below:

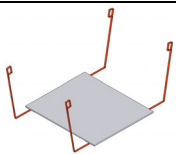
- BINDER product type and serial number
- Date of purchase
- Name and address of the dealer from which you bought the BINDER product
- Exact description of defect or fault
- Your full address; if possible contact person and availability of that person
- Exact location of the BINDER product
- Contamination clearance certificate (chap. 20) via fax in advance

The authorization number needs to be applied to the packaging in such a way that it can be easily recognized or be recorded clearly in the delivery documents.

	<p>For security reasons we cannot accept your delivery if it does not carry an authorization number.</p>
---	--

17. Disposal

17.1 Disposal of the transport packing

Packing element	Material	Disposal
Straps to fix packing on pallet	Plastic	Plastic recycling
Wooden transport box (option) with metal screws	Non-wood (compressed match-wood, IPPC standard)	Wood recycling
	Metal	Metal recycling
Pallet	Solid wood (IPPC standard)	Wood recycling
Transport box with metal clamps	Cardboard	Paper recycling
	Metal	Metal recycling
Wooden sticks for stabilizing and for take out (size 240)	Solid wood (IPPC standard)	Wood recycling
Foamed plastic stuffing (pallet, top cover)	PE foam	Plastic recycling
Top cover	Cardboard	Paper recycling
Take out assistance (size 240 only) 	Cardboard	Paper recycling
	Plastic	Plastic recycling
Edge protection	Styropor®	Plastic recycling
Protection of doors and racks	PE foam	Plastic recycling
Bag for operating manual	PE foil	Plastic recycling
Insulating air cushion foil (packing of optional accessories)	PE foil	Plastic recycling

If recycling is impossible, all packing parts can also be disposed of in the household waste.

17.2 Decommissioning

To pump off the water from the humidifying system, close the water supply, switch on humidity switch (3), and switch on and off the unit twice allowing it each time to run about 2 minutes.

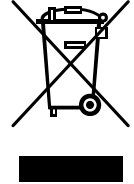
Switch off main switch (2) and humidity switch (3). Disconnect the unit from the mains. Remove the water installation.

- Temporal decommissioning: See indications for appropriate storage, chap. 3.3.
- Final decommissioning: Dispose of the unit as described in chap. 17.3 to 17.5.


17.3 Disposal of the unit 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 climatic chamber KBF / KBF-ICH 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. An important part of the materials must be recycled in order to protect the environment.






After the end of utilization 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 the BINDER service who will organize taking back and disposal of the unit according to the German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG) from 23 March 2005, BGBl. I p. 762.

CAUTION	
	<p>Violation against existing law.</p> <ul style="list-style-type: none"> ⊘ Do NOT dispose of BINDER devices at public collecting points. ➤ Have the device disposed of professionally at a recycling company which is certified according to the German national law for electrical and electronic equipment (Elektro- und Elektronikgerätegesetz, ElektroG) from 23 March 2005, BGBl. I p. 762. <li style="text-align: center;"><i>or</i> ➤ Instruct the 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 unit.

Certified companies disassemble waste BINDER equipment in primary substances for recycling according to directive 2002/96/EC by. In order to exclude any health hazard for the employees of the recycling companies, the devices must be free from toxic, infectious or radioactive substances.

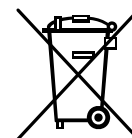
	<p>It is the user's responsibility that the unit is free from toxic, infectious or radioactive substances prior to handing it over to a recycling company.</p> <ul style="list-style-type: none"> – Prior to disposal clean the unit from all introduced or sticking toxic substances. – Prior to disposal disinfect the unit from all sources of infection. Be aware of the fact that sources of infection might be located as well outside the inner chamber. – If you cannot safely free the unit from toxic substances and sources of infection, dispose of it as special waste according to national law. – Fill out the contamination clearance certificate (chap. 20) and enclose it with the unit.
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 	 WARNING
	<p>Contamination of the device with toxic, infectious or radioactive substances.</p> <p>Danger of intoxication.</p> <p>Danger of infection.</p> <ul style="list-style-type: none"> ⊘ NEVER lead a unit with sticking toxic substances or sources of infection to recycling according to directive 2002/96/EC. ➤ Prior to disposal, free the unit from sticking toxic substances or sources of infection. ➤ Dispose of a unit which you cannot safely free from all toxic substances or sources of infection as special waste according to national law.


17.4 Disposal of the unit 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 climatic chamber KBF / KBF-ICH 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.






After the end of utilization, notify the distributor who sold you the device, who will take back and dispose of the unit according to the directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE).



	CAUTION
	<p>Violation against existing law.</p> <ul style="list-style-type: none"> ⊘ Do NOT dispose of BINDER devices at public collecting points. ➤ Have the device disposed of professionally at a recycling company which is certified according to conversion of the directive 2002/96/EC into national law. <li style="text-align: center;"><i>or</i> ➤ Instruct the distributor who sold you the device to dispose of it. The agreements apply that were reached with the distributor when purchasing the unit (e.g. his general terms of payment and delivery). ➤ If your distributor is not able to take back and dispose of the unit, please contact the BINDER service.

Certified companies disassemble waste BINDER equipment in primary substances for recycling according to directive 2002/96/EC by. In order to exclude any health hazard for the employees of the recycling companies, the devices must be free from toxic, infectious or radioactive substances.

	<p>It is the user's responsibility that the unit is free from toxic, infectious or radioactive substances prior to handing it over to a recycling company.</p> <ul style="list-style-type: none"> - Prior to disposal clean the unit from all introduced or sticking toxic substances. - Prior to disposal disinfect the unit from all sources of infection. Be aware of the fact that sources of infection might be located as well outside the inner chamber. - If you cannot safely free the unit from toxic substances and sources of infection, dispose of it as special waste according to national law. - Fill out the contamination clearance certificate (chap. 20) and enclose it with the unit.
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	<div style="text-align: right;">  WARNING </div>
	<p>Contamination of the device with toxic, infectious or radioactive substances.</p> <p>Danger of intoxication.</p> <p>Danger of infection.</p> <ul style="list-style-type: none"> Ø NEVER lead a unit with sticking toxic substances or sources of infection to recycling according to directive 2002/96/EC. ➤ Prior to disposal, free the unit from sticking toxic substances or sources of infection. ➤ Dispose of a unit which you cannot safely free from all toxic substances or sources of infection as special waste according to national law.

17.5 Disposal of the unit in non-member states of the EC

	<div style="text-align: center;"> CAUTION </div>
	<p>Alteration of the environment.</p> <ul style="list-style-type: none"> ➤ For final decommissioning and disposal of the climatic chamber, please contact the BINDER service. ➤ Observe the regulations under public law for appropriate disposal protecting the environment.

The main board of the climatic chamber includes a lithium cell. Please dispose of it according to the national regulations.


The refrigerant used R 134a (1,1,1,2-tetrafluoroethane) is not inflammable at ambient pressure. It must not reach the environment. Professionally suck the refrigerant off the refrigeration cycle and dispose of it according to the national regulations.

18. Troubleshooting

Fault description	Possible fault cause	Required measures
Heating		
Chamber heating permanently, set-point not held.	Controller defective.	Contact the BINDER service.
	Semiconductor relay defective.	
	Controller not well adjusted, or adjustment interval exceeded.	Calibrate and adjust controller.
Chamber doesn't heat up.	Pt 100 sensor defective.	Contact the BINDER service.
	Heating element defective.	
	Semiconductor relay defective	
Chamber doesn't heat up when switching on the chamber. Safety controller responds.	Limit temperature reached. Safety controller (chap. 10.2) set too low.	Let the chamber cool down and hit RESET button of MB1 controller. If appropriate, select suitable limit value.
	Safety controller (chap. 10.2) defective.	Contact the BINDER service.
Unit without function.	No power supply.	Check connection to power supply.
	Wrong voltage.	Check power supply for voltage of 115V or 230V.
	Unit fuse has responded.	Check unit fuse and replace it if appropriate. If it responds again, contact the BINDER service.
	Controller defective.	Contact the BINDER service.
	Nominal temperature exceeded by 10° due to unit failure. Over temperature protective device (class 1) responds.	
Mechanical safety device class 3.1 responds (with option safety device class 3.3).	Limit temperature reached.	Check setting of temperature set-point and of safety device class 3.1. If appropriate, select suitable limit value.
	Too much external heat load.	Reduce heat load.
	Controller defective.	Contact the BINDER service.
	Safety device defective.	
	Semi-conductor relay defective	
Mechanical safety device class 3.2 responds (with option safety device class 3.3).	Limit temperature reached.	Check setting of temperature set-point and of safety device class 3.2. If appropriate, select suitable limit value.
	Controller or safety device defective.	Contact the BINDER service.
Refrigerating performance		
No or too low refrigerating performance.	Ambient temperature > 20°C (chap.3.4).	Select cooler place of installation.
	Combination of temperature/humidity values not in the optimum range (see temperature humidity diagram, Figure 15).	Select combination of temperature/humidity values in the optimum range (chap. 12).
	Compressor not switched on.	Contact the BINDER service.
	Electro-valves defective.	
	No or not enough refrigerant.	
	Too much external heat load.	Reduce heat load.

Fault description	Possible fault cause	Required measures
Humidity		
Humidity fluctuation: Control accuracy of $\pm 3\%$ r.F. is not reached.	Too low or too high water conductivity.	Check the conductivity (see chap. 4.1). At deviating values, contact the BINDER service.
	Door gasket defective.	Replace door gasket.
	Door opened very frequently.	Open doors less frequently.
Longer humidity fluctuations every 3 days.	One capillary tube blocked.	Contact the BINDER service.
Humidity fluctuation, together with temperature fluctuation $> 1^\circ\text{C}$ at set-point ca. 3°C over ambient temperature.	Place of installation too hot.	Select cooler place of installation or contact the BINDER service.
No or too low dehumidification.	Magnetic valves of the dehumidification Y1/ Y2 defective	Contact the BINDER service.
	Capillary tube blocked	
	Not enough refrigerant.	
Icing at the sides of the inner chamber.	Set-point for a long time below ambient temperature.	Defrost the unit (chap. 13).
Condensation at the sides of the inner chamber.	Combination of temperature/humidity values not in the optimum range (see temperature humidity diagram, Figure 15)	Select combination of temperature/humidity values in the optimum range (chap. 12).
	Set-point for a long time below ambient temperature, icing in the preheating chamber.	Defrost the unit (chap. 13)
Bad humidity and temperature variation	Fan speed has been reduced.	Set fan speed to 100%.
Controller		
No entries to controller keypad possible. Notification "KEY LOCK" is displayed	Keyboard locking (option) activated.	Unlock keyboard locking (chap. 14.5).
No access to menu "User settings".	User code forgotten.	Contact the BINDER service.
Wrong temperature alarms, disturbance of temperature accuracy	Temperature unit changed to $^\circ\text{F}$.	Set temperature unit to $^\circ\text{C}$ (chap. 6.4).
Chart recorder function: measured-value memory cleared, information loss.	New setting of storage rate.	Change the storage rate ONLY if the previously registered data are no more required (chap. 7).
Controller does not attain set-points entered in Manual Mode.	Button EXIT or AUTOMATIC has been hit: Unit is in Idle Mode.	Change to Manual Mode (chap. 8).
Controller does not attain program set-points.	Button EXIT or AUTOMATIC has been hit: Unit 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 allow 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.
Humidity alarm message when operating without humidity (humidity switch (3) OFF)	Humidity set-point set to a value $> 0\%$ r.F.	Manual Mode: Enter a humidity set-point 0% r.H. Program Mode: Enter a humidity subprogram with humidity set-point 0% r.H.

Fault description	Possible fault cause	Required measures
Controller (continued)		
RESET button does not cancel the notifying or alarm indication.	Cause of disturbance not removed correctly The RESET button allows resetting notifying or alarm messages for temperature and humidity only with in a tolerance sector of +/- 2°C resp. +/- 5 % r.H.	Remove cause of disturbance. If the RESET button still does not cancel the indication, contact the BINDER service.
Controller display too dark.	Contrast set too low.	Increase display contrast (chap. 6.3).
Display flashing: 1999 or -1999 or 9999.	Sensor rupture between sensor and controller or Pt 100 sensor defective.	Contact the BINDER service.
	Short-circuit. Initialization problem due to switching on the chamber too early.	
Miscellaneous		
Fluorescent tube of ICH compliant illumination (option) does not illuminate.	Defective fluorescent tube.	Replace fluorescent tube.
impair valve function of hose burst protection.	Calcification.	Remove calcifications by citric acid or acetic acid solutions (chap. 4.2). Inspection of the valve by a plumber.

	Repair must only be performed by qualified service personnel authorized by BINDER. Repaired units must comply with the BINDER quality standards.
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19. Technical description

19.1 Factory calibration and adjustment

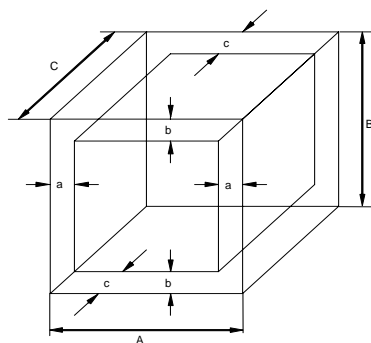
This unit was calibrated and adjusted in factory. Calibration and adjustment were performed using standardized test instructions, according to the QM-system of DIN EN ISO 9001 applied by BINDER (certified since December 1996 by TÜV CERT). All test equipment used is subject to the administration of measurement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

19.2 Over current protection

The devices are protected by one miniature fuse against over current, accessible from the outside. The miniature fuse is located at the rear of the chamber below the strain relief of the power cord. The fuse holder is equipped with a fuse clip 5mm x 20 mm. The fuse may be replaced only with a substitute of the same ratings. Refer to the technical data of the respective device type. If the fuse is blown, please inform an electronic engineer or the BINDER service.

19.3 Definition of usable space

The usable volume illustrated below is calculated as follows:



A, B, C = internal dimensions (W, H, D)
a, b, c = wall separation

$a = 0.1 \cdot A$
 $b = 0.1 \cdot B$
 $c = 0.1 \cdot C$

$$V_{USE} = (A - 2 \cdot a) \cdot (B - 2 \cdot b) \cdot (C - 2 \cdot c)$$

Figure 23: Determination of the usable volume

The technical data refer to the so defined usable space.



Do NOT place samples outside this usable volume.

Do NOT load this volume 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 allow circulation between them and thus obtain a homogenous distribution of temperature and humidity.

19.4 Technical Data KBF / KBF-ICH

Unit size			115	240	720
Exterior dimensions					
Width	mm / inch		834 / 32.83	1034 / 40.71	1234 / 48.58
Height (incl. feet/roller)	mm / inch		1022 / 40.24	1142 / 44.96	1816 / 71.50
Depth	mm / inch		646 / 25.43	746 / 29.37	867 / 34.13
incl. door handle, I-triangle, connection	mm / inch		100 / 3.94	100 / 3.94	100 / 3.94
Wall clearance rear	mm / inch		100 / 3.94	100 / 3.94	100 / 3.94
Wall clearance side	mm / inch		160 / 6.30	160 / 6.30	160 / 6.30
Steam space volume	l / cu.ft.		158 / 5.58	308 / 10.88	855 / 30.21
Height of water connections	± 3 mm		84 / 3.31	84 / 3.31	190 / 7.48
Interior dimensions					
Width	mm / inch		600 / 23.62	800 / 31.50	1000 / 39.37
Height	mm / inch		480 / 18.90	600 / 23.62	1168 / 45.98
Depth	mm / inch		400 / 15.75	500 / 19.69	600 / 23.62
Interior volume	l / cu.ft.		115 / 4.1	240 / 8.6	700 / 25.1
Number of racks standard / max.			2/5	2/7	2/14
Load per rack	kg / lbs.		20 / 44	30 / 66	45 / 99
Permitted total load	kg / lbs.		50 / 110	70 / 155	120 / 265
Weight (empty) KBF	kg / lbs.		115 / 254	160 / 353	278 / 614
Weight (empty) KBF-ICH	kg / lbs.		--	184 / 406	345 / 762
Temperature data KBF					
Temperature range	without humidity	°C / °F	-10 to +100 14 to 212	-10 to +100 14 to 212	-10 to +100 14 to 212
	with humidity	ca. °C / °F	+10 to +90 50 to 194	+10 to +90 50 to 194	+10 to +90 50 to 194
Temperature variation without humidity	at 10°C	± °C	0.4	0.4	0.4
	at 37°C	± °C	0.3	0.4	0.4
Temperature variation with humidity		± °C	1.0	1.0	1.0
Temperature fluctuation from 5°C above room temperature		± °C	0.1	0.1	0.1
Temp. fluctuation when refrigerating		± °C	0.5	0.5	0.5
Heating up time 1) to 37°C		minutes	23	30	28
Cooling down time from room temp 1) 2) to 10°C		minutes	35	35	35
Recovery time after doors were open for 30 sec. 1)	at 37°C	minutes	5	5	5
	at 50°C	minutes	4	4	4
Humidity fluctuation 3)		± % r.H.	1.5	1.5	1.5
Temperature data KBF-ICH					
Temperature range	without humidity / without lighting	ca. °C / °F	--	-5 to +100 23 to 212	-5 to +100 23 to 212
	without humidity / with lighting	ca. °C / °F	--	+5 to +100 41 to 212	+5 to +100 41 to 212
	with humidity, without lighting	ca. °C / °F		+20 to +90 68 to 194	+20 to +90 68 to 194
	with humidity / with lighting	ca. °C / °F	--	+20 to +90 68 to 194	+20 to +90 68 to 194
Temperature variation without humidity	at 10°C	± °C	--	0.4	0.4
	at 37°C	± °C	--	0.4	0.4
Temperature variation with humidity		± °C	--	1.0	1.0
Temperature fluctuation when heating		± °C	--	0.1	0.1
Temp. fluctuation when refrigerating		± °C	--	0.5	0.5
Heating up time 1) to 37°C		minutes	--	30	28
Cooling down time from room temp. 1) 2) to 10°C		minutes	--	35	35
Recovery time after doors were open for 30 sec. 1)	at 37°C	minutes	--	5	5
	at 50°C	minutes	--	4	4




Unit size		115	240	720
Humidity fluctuation 3)		--	1.5	1.5
Electrical data KBF				
IP system of protection acc. to EN 60529		20	20	20
Nominal voltage ($\pm 10\%$) 50/60 Hz	V	230 1N~	230 1N~	230 1N~
Nominal power	W	1700	2250	2760
Energy consumption 4) at 37°C	W	530	550	610
Installation category acc. to IEC 1010-1		II	II	II
Pollution degree acc. to IEC 1010-1		2	2	2
Miniature fuse (M) 230 V / 5 x 20 mm	Amp	10	16	16
Electrical data KBF-ICH				
IP system of protection acc. to EN 60529		--	20	20
Nominal voltage ($\pm 10\%$) 50/60 Hz	V	--	230 1N~	230 1N~
Nominal power	W	--	2420	2950
Energy consumption 4) at 37°C	W	--	730	970
Installation category acc. to IEC 1010-1		--	II	II
Pollution degree acc. to IEC 1010-1		--	2	2
Miniature fuse (M) 230 V / 5 x 20 mm	Amp	--	16	16
Light data KBF / KBF-ICH				
ICH compliant illumination in the doors (KBF-ICH) for photo stability testing 5)	Lux	--	4000	4000
	UVA W/m ²	--	1.7	1.7
ICH compliant illumination under the ceiling for photo stability testing (option) 5)	Lux	--	4000	4000
	UVA W/m ²	--	1.7	1.7

Legend:


- 1) to 98 % of the set value
- 2) Value without lighting
- 3) Upon door opening or water exchange in humidity cylinder > 1.5 % r.H., recovery time approx. 20 min.
- 4) Use this value for dimensioning air condition systems.
- 5) Maximal value, measured in center of usable volume.

All technical data are specified for units with standard equipment at an ambient temperature of +20°C and a mains voltage fluctuation of ± 10 . The temperature data are determined in accordance to factory standard following DIN 12880, part 2, respecting the recommended wall clearances of 10 % of the height, width and depth of the inner chamber. Technical data refer to 100% fan speed.

All indications are average values, typical for units produced in series. We reserve the right to alter technical specifications at all times.

	Refrigerating performance decreases while operating the chamber at temperatures < 0°C due to icing of the evaporators. For this reason defrost the chamber regularly, e.g. once a week.
	If the chamber is fully loaded, the specified heating up and cooling down times may vary according to the load.
	Bringing in a humidity source to the inner chamber affects the minimal humidity range.

19.5 Equipment and Options KBF / KBF-ICH


	To operate the climatic chamber, use only original BINDER accessories or accessories of third-party suppliers authorized by BINDER. The user is responsible for any risk when using unauthorized accessories.
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Unit Size	115	240	720
Regular equipment			
Microprocessor screen program controller with 2-channel technology for temperature and humidity	●	●	●
Communication interface RS 422	●	●	●
Temperature safety device class 3.1 acc. to DIN 12880	●	●	●
Inner glass door	●	●	●
DCT™ refrigerating system with refrigerant R134a	●	●	●
Microprocessor controlled humidifying and dehumidifying system 6) (humidity range, see diagram)	●	●	●
Four castors (2 lockable)	--	--	●
Access port 29 mm with silicone plug	●	●	●
ICH compliant illumination in the doors (KBF-ICH) for photo stability testing	--	●	●
Options / accessories			
Additional rack, stainless steel	○	○	○
Perforated rack, stainless steel	○	○	○
Reinforced rack with rack lockings	--	○	○
Securing elements for additional fastening of racks (4 pieces)	○	○	○
Reinforced inner chamber with 2 reinforced racks	--	○	○
Temperature safety device class 3.3 acc. to DIN 12880	○	○	○
Zero-voltage relay alarm outputs for temperature and humidity with DIN plug 6-poles	○	○	○
Interior lighting	○	○	○
Keyboard locking	○	○	○
Lockable door	○	○	○
Access ports 29 mm or 50 mm with silicone plug	○	○	○
Water protected internal socket 230 V AC	○	○	○
ICH compliant illumination under the ceiling for photo stability testing	--	○	○
Safety kit for water connection with hose burst protection device and reflux protection device, pre-mounted assembly	○	○	○
Built-in 2-channel pen recorder with digital display for temperature and humidity	○	○	○
Analog outputs 4-20 mA for temperature and humidity with 6 pole DIN socket, DIN plug included	○	○	○
Factory calibration certificate	○	○	○
Extension to factory calibration certificate (additional value)	○	○	○
Measurement and protocol according to DIN 12880	○	○	○
Qualification folder	○	○	○
Certificate illumination measurement: Radiometrical measurement in visible and UVA spectral range with documentation of intensity distribution and of qualitative spectral distribution	--	○	○

Legend: ● Standard equipment ○ Optional -- Not available

- 6) A water tap (1 bar to 10 bar) with normal tap water (approx. 200 $\mu\text{S}/\text{cm}$ to 500 $\mu\text{S}/\text{cm}$, tolerance range 100 $\mu\text{S}/\text{cm}$ to 800 $\mu\text{S}/\text{cm}$) is necessary for the installation of the humidification system (chap. 4.1). Furthermore, a water drain with descending gradient is required (chap. 4.3).

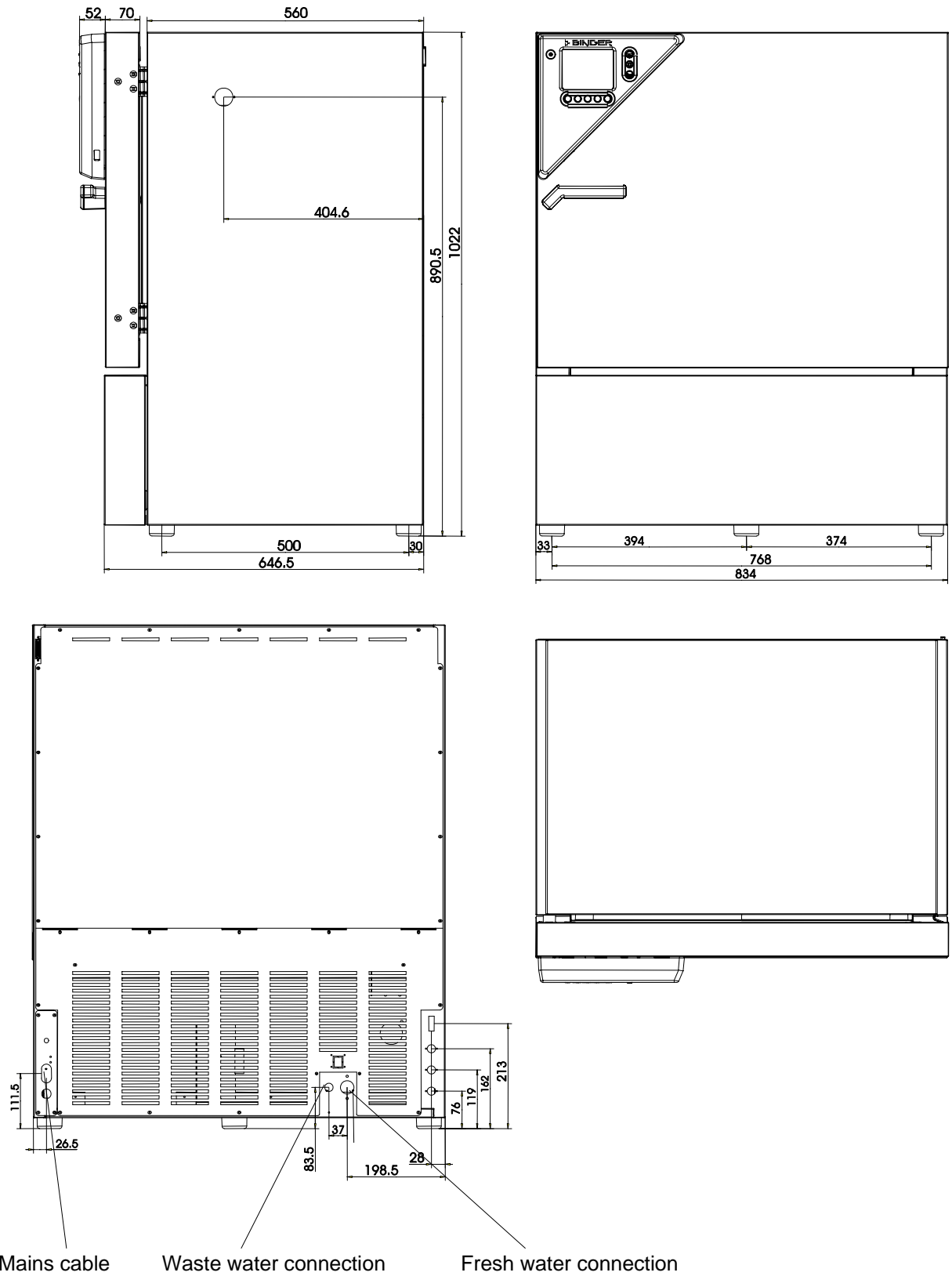
19.6 Spare parts

	<p>The BINDER GmbH is responsible for safety-related unit properties only if skilled electricians or qualified personnel authorized by BINDER perform all maintenance and repair, and if components with relating to chamber safety are replaced in case of failure with original spare parts. The user is responsible for any risk when using unauthorized accessories.</p>
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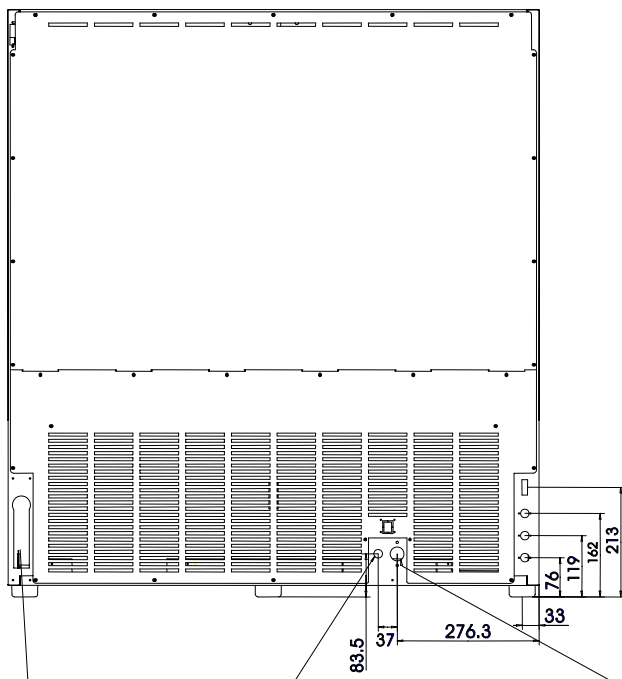
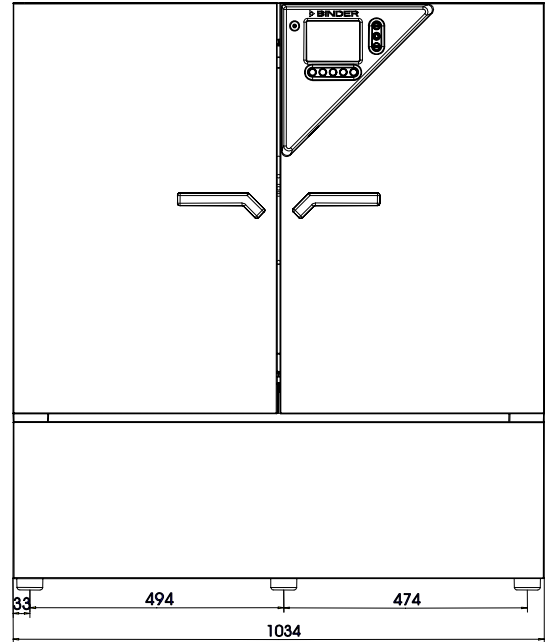
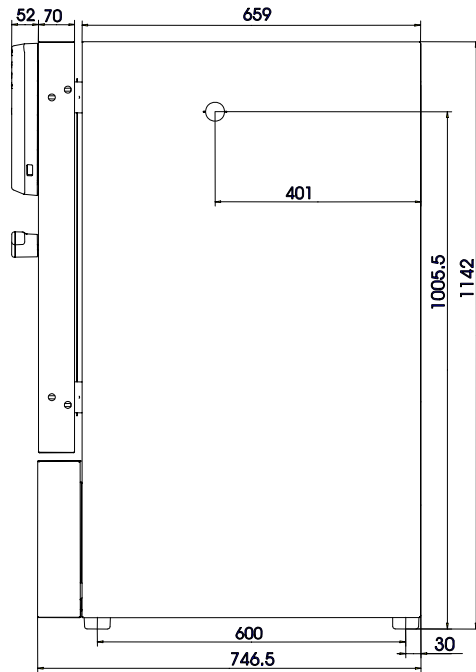
Accessories and spare parts:

Unit size	115	240	720
Description	Art. no.		
Rack, stainless steel	6004-0008	6004-0009	6004-0010
Perforated rack, stainless steel	6004-0030	6004-0031	6004-0033
Reinforced rack with rack lockings	--	8012-0345	8012-0374
Door gasket silicone	6005-0096	6005-0097	6005-0087
Stable table on wheels with castors and locking brakes	9051-0018	9051-0019	--
Fluorescent tube light color 640 cool white	--	5008-0014	5008-0015
Fluorescent tube light color 09 UVA	--	5008-0044	5008-0045
Miniature fuse (M) 230 V / 5 x 20 mm	5006-0012	5006-0013	5006-0013
Safety kit for water connection with hose burst protection device and reflux protection device	8012-0112		
Program controller MB1, screen	5014-0059		
Program controller MB1, E/A board	5014-0060		
Temperature safety device, class 1 (complete)	8009-0335		
Temperature safety device, class 3.1	5006-0035		
Temperature safety device, class 3.2	5006-0026		
Securing elements for additional fastening of racks (4 pieces)	8012-0531		
Temperature sensor (Pt 100) bend-off	5002-0031		
Radial fan	5013-0021		
Door switch	5019-0009		
Electrodes	5005-0055		
Steam cylinder	6011-0006		
O-Ring cylinder foot	3004-0005		
O-Ring cylinder flange	3004-0006		
Large area electrodes in case of too low conductivity	5005-0056		
Partition wall for steam cylinder in case of too high conductivity	6002-0088		
Calibration certificate	8012-0154		
Extension for calibration certificate (additional value)	8012-0155		
Measuring protocol acc. to DIN 12880, Part 2	8012-0157		
Certificate illumination measurement	8012-0417		
Qualification folder	8012-0423		
Neutral cleaning agent, 1 kg	1002-0016		

19.7 Dimensions KBF 115



19.8 Dimensions KBF 240 / KBF-ICH 240

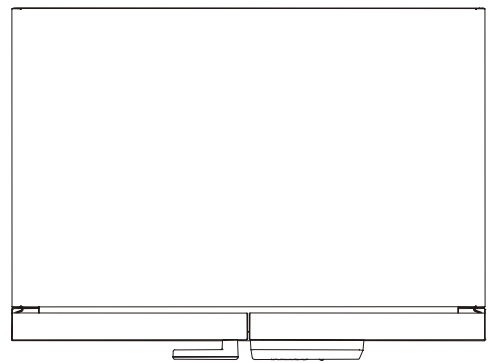
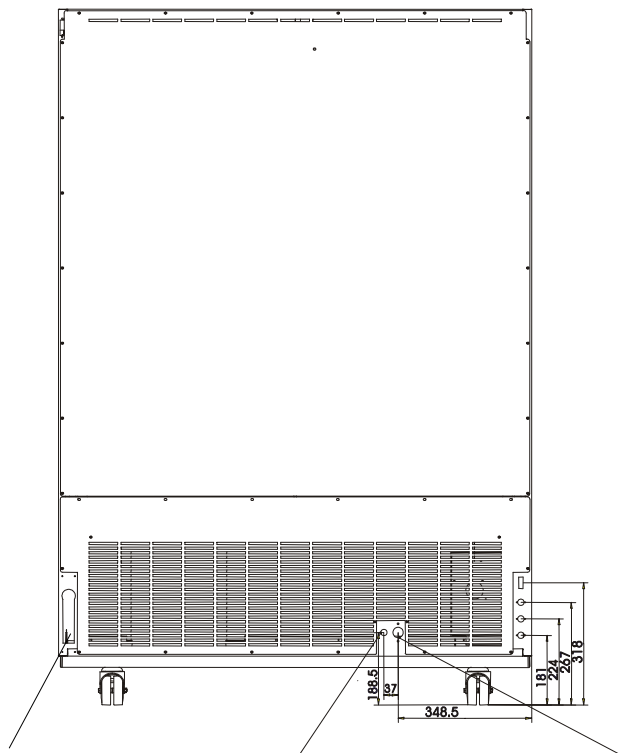
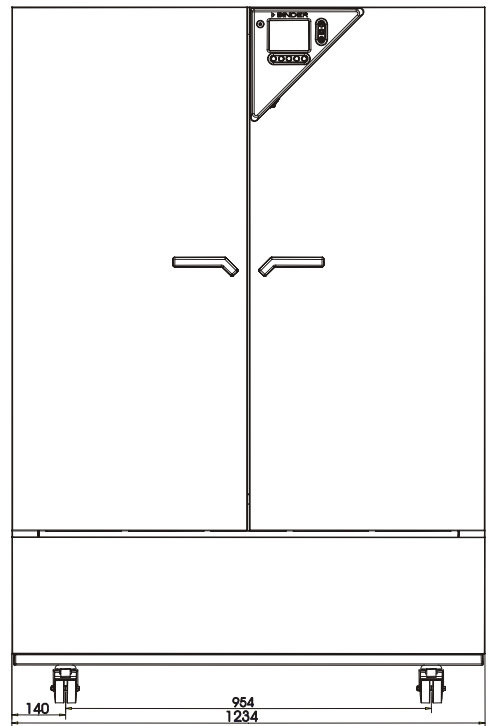
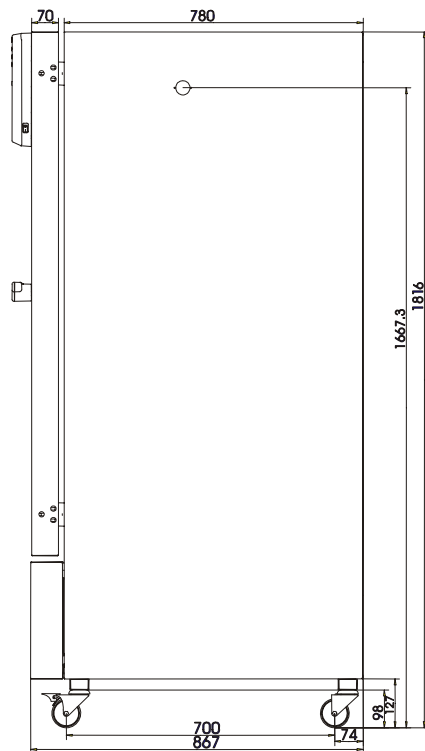


Mains cable

Waste water connection

Fresh water connection

19.9 Dimensions KBF 720 / KBF-ICH 720



Mains cable

Waste water connection

Fresh water connection

20. Contamination clearance certificate

Unbedenklichkeitsbescheinigung

Declaration of harmlessness with regard to safety and health

Erklärung zur Sicherheit and gesundheitlichen Unbedenklichkeit

The German Ordinance on Hazardous Substances (GefStofV), and the regulations regarding safety at the workplace, require that this form be filled out for all products that are returned to us, so that the safety and health of our employees can be warranted.

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.



In the absence of a completely filled out form, a repair is not possible.
Ohne Vorliegen des vollständig ausgefüllten Formblattes ist eine Reparatur nicht möglich.

- A completely filled out form should be transmitted by Fax (+49 (0) 7462 2005 93555) or by letter in advance to us, so that this information is available before the equipment/component part arrives. A second copy of this form should accompany the equipment/component part. Eventually 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 beigelegt sein. Ggf. ist auch die Spedition zu informieren.
- Incomplete information or non-conformity with this procedure will inevitably lead to substantial delays in processing. We hope you will have understanding for this measure, which lies outside of our area of influence, and that you 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 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) :
<input type="checkbox"/>	4.1 For non toxic, non radioactive, biologically harmless materials / für nicht giftige, nicht radioaktive, biologisch ungefährliche Stoffe:
We herewith guarantee that the above-mentioned unit / component part... / Wir versichern, dass o.g. Gerät/Bauteil...	
<input type="checkbox"/>	Has not been exposed to or contains any toxic or otherwise hazardous substances / weder giftige noch sonstige gefährliche Stoffe enthält oder solche anhaften.
<input type="checkbox"/>	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.
<input type="checkbox"/>	Eventual residues of hazardous substances have been removed / evtl. Rückstände von Gefahrstoffen entfernt wurden.
<input type="checkbox"/>	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 herewith guarantee that ... / Wir versichern, dass ...	
<input type="checkbox"/>	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.
<input type="checkbox"/>	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 herewith declare that the following measures have been taken / Wir erklären, dass folgende Maßnahmen getroffen wurden:

- Hazardous substances were removed from the unit / component part, so that no hazard exists for corresponding persons 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 herewith 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: _____

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 works on site, such a contamination clearance certificate must be submitted to the service technician before the start of the works. No repair or maintenance of the equipment is possible, without a properly filled out contamination clearance certificate.

