Model KB 400 | Cooling incubators with compressor technology

The powerful virtuoso in cooling incubators for microorganisms: the KB masters temperature ranges from -10 °C to 100 °C. The new KB series consumes up to 30% less energy compared to its predecessor. With its extensive programming options and homogenous incubation conditions even when fully loaded, this cooling incubator covers a wide range of applications.

BENEFITS

- Safe, reproducible incubation, even at high ambient temperatures
- Disinfection routine at 100 °C
- Up to 30% lower energy consumption compared to the previous model

Model 400

Model 400

MAIN FEATURES

- Temperature range: -10 °C to 100 °C
- APT.line™ preheating chamber technology
- Up to 30% lower energy consumption compared to the previous model
- Cooling with compressor cooling unit
- Door heating
- Adjustable fan speed
- Controller with time-segment and real-time programming
- Inner door made of tempered safety glass
- 2 stainless steel racks
- 4 casters, two with locking brakes
- Access port with silicone plug, 30 mm, left
- Class 3.1 independent temperature safety device (DIN 12880) with visual and acoustic alarm
- Computer interface: Ethernet

ORDERING INFORMATION

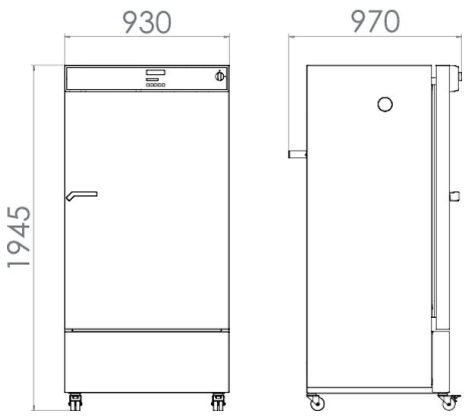
Interior volume [L]	Voltage	Option model	Version	Art.-No.
400	200…240 V 1~ ph 50/60 Hz	Standard	KB400-230V	9020-0203
	100…120 V 1~ ph 50/60 Hz	Standard	KB400UL-120V	9020-0305

TECHNICAL DATA

Description	KB400-230V[1]	KB400UL-120V[1]
Article Number	9020-0203	9020-0305
Performance Data Temperature		
Temperature range	-10…100	-10…100
Temperature variation at 37 °C [± K]	0.2	0.2
Temperature fluctuation at 37 °C [± K]	0.1	0.1
Recovery time after 30 seconds door open at 37 °C [min]	4	4
Electrical data		
Rated Voltage [V]	200…240	100…120
Power frequency [Hz]	50/60	50/60
Nominal power [kW]	1.4	1.4
Unit fuse [A]	16	16
Phase (Nominal voltage)	1~	1~
Measures		
Interior volume [L]	400	400
Net weight of the unit (empty) [kg]	220	220
Permitted load [kg]	120	120
Load per rack [kg]	30	30
Wall clearance back [mm]	100	100
Wall clearance sidewise [mm]	100	100
Internal Dimensions		
Width [mm]	650	650
Height [mm]	1270	1270
Depth [mm]	485	485
Doors		
Inner doors	1	1
Unit doors	1	1
Housing dimensions not incl. fittings and connections		
Width net [mm]	925	925
Height net [mm]	1950	1950
Depth net [mm]	805	805
Environment-specific data		
Energy consumption at 37 °C [Wh/h]	330	330
Sound-pressure level [dB(A)]	53	53
Fixtures		
Number of shelves (std./max.)	2/15	2/15

1 All technical data is specified for unloaded units with standard equipment at an ambient temperature of +22 °C ±3 °C and a power supply voltage fluctuation of ±10 %. The temperature data is determined in accordance to BINDER factory standard following DIN 12880, observing the recommended wall clearances of 10 % of the height, width, and depth of the inner chamber. Technical data refers to 100 % fan speed. All indications are average values, typical for units produced in series. We reserve the right to change technical specifications at any time.

DIMENSIONS incl. fittings and connections [mm]



OPTIONS

Designation	Description	*	Art.-No.
Access port with silicone plug	left		
	30 mm	01	8012-0648
	50 mm	01	8012-0653
	right		
	30 mm	01	8012-0647
	50 mm	01	8012-0652
	top		
	30 mm	01	8012-0649
	50 mm	01	8012-0650
	100 mm	01	8012-0651
Alarm output, zero-voltage	for temperature (±2 °C), accessible via 6-pin DIN socket (max. 24 V - 2.5 A), with audible signal that can be switched off	–	8012-1083
Calibration certificate, expanded	for temperature; for extending the measurement in center of chamber to include another test temperature	–	8012-1120
Calibration certificate, temperature	for temperature, measurement in center of chamber at specified temperature	–	8012-1139
	temperature measurement incl. certificate and 27 measuring points at specified temperature	–	8012-1598
	temperature measurement incl. certificate, 15- 18 measuring points at specified temperature	–	8012-1577
	temperature measurement incl. certificate, 9 measuring points at specified temperature	–	8012-1556
Class 3.3 independent temperature safety device	with visual alarm (DIN 12880)	–	8012-1081
Door lock	lockable door handle	–	8012-1774
Interior lighting	with two 15 W light bulbs		
	120 V option model	02	8012-1070
	230/240 V option model	02	8012-1071
Interior socket	Waterproof, switched flush-mounting box (CA3GD) for nominal voltage in unit interior, with cover and corresponding plug (nominal voltage; max. 500 W; max. 90 °C; protection class IP67)	07	8012-1075
Pt 100 temperature sensor	additional flexible Pt 100, interior, for displaying the temperature on the unit display	–	8012-1079
Shelf, reinforced	positioned at bottom level, max. load 45 kg, with additional attachment for operation of shaking device, stirring device or roller bottle system	–	8012-0639

* Notes › See last page

ACCESSORIES

Designation	Description	*	Art.-No.
APT-COM™ 4 BASIC-Edition	for simple logging and documentation requirements with up to 5 networked units.		
	version 4, BASIC edition	19	9053-0039

* Notes › See last page

Designation	Description	*	Art.-No.
APT-COM™ 4 GLP-Edition	for working under GLP-compliant conditions. Measured values are documented in a tamper-proof way in line with the requirements of FDA Regulation 21 CFR 11.		
	version 4, GLP edition	19	9053-0042
APT-COM™ 4 PROFESSIONAL-Edition	convenient unit and user management built on the BASIC edition. Suitable for networking up to 100 units.		
	version 4, PROFESSIONAL edition	19	9053-0040
Data Logger Kit	T 220: For continuous temperature logging from -90 °C to 220 °C. The kit includes 1 data logger, Pt 100 sensor with 2 m extension cable and 1 magnetic fixture for mounting to the BINDER unit	19	8012-0715
Data Logger Software	LOG ANALYZE software kit, configuration and evaluation software for all BINDER Data Logger Kits (incl. USB data cable)	19	8012-0821
LED light bars	Basic set consisting of 2 pieces, attachment material, control unit for max. 4 light strips, 100-240 V, 50/60 Hz		
	Basic set 300, length 30 cm	–	8012-1107
	Basic set 500, length 50 cm	–	8012-1108
	Basic set 900, length 90 cm	–	8012-1109
	Expansion set consisting of 2 pieces, attachment material: clips. For expanding the basic set of light bars		
	Expansion set 300, length 30 cm	–	8012-1716
	Expansion set 500, length 50 cm	–	8012-1717
	Expansion set 900, length 90 cm	–	8012-1718
pH-neutral detergent	concentrated, for gentle remove of residual contaminants; 1 kg	–	1002-0016
Qualification documents	IQ/OQ documents – supporting documents for validation performed by customers, consisting of: IQ/OQ checklists incl. calibration guide and comprehensive unit documentation; parameters: temperature, CO_2, O_2, pressure, depending on unit		
	Digital in PDF format	–	7057-0001
	Hard copy inside folder	–	7007-0001
	IQ/OQ/PQ documents – supporting documents for validation performed by customers, according to customer requirements, PQ section added to qualification folder IQ/OQ; parameters: temperature, CO_2, O_2 – or pressure, depending on unit		
	Digital in PDF format	–	7057-0005
	Hard copy inside folder	–	7007-0005
Rack	stainless steel	–	6004-0101
Rack accessories	fasteners (1 set of 4) for additional security of racks	–	8012-0620
Rack, reinforced	stainless steel, with fasteners (1 set of 4)	–	8012-0638
Shelf, perforated	Stainless steel	–	6004-0040

* Notes › See last page

SERVICES

Designation	Description	*	Art.-No.
Installation services			
Unit installation	Unpacking and setting up of unit, connecting to existing connections, and checking function	13, 18	DL10-0100
Unit instructions	Unit function instructions for operation and programming of the controller	18	DL10-0500
Preventive maintenance			
Maintenance	Functional testing of all electrical and mechanical components, short calibration, documentation in the maintenance schedule	14, 18	DL20-0200
Calibration services			
Temperature calibration	Expansion – including certificate, each additional measuring point in center of chamber at specified test temperature	14, 16, 17, 18	DL30-0102
	Temperature calibration with 1 measuring point in center of chamber at a specified test temperature, including certificate	14, 16, 17, 18	DL30-0101
Temperature measurement, 18 measuring points	Temperature measurement with 18 measuring points at a specified test temperature, including certificate	14, 16, 17, 18	DL30-0118
Temperature measurement, 27 measuring points	Temperature measurement with 27 measuring points at a specified test temperature, including certificate	14, 16, 17, 18	DL30-0127
Temperature measurement, 9 measuring points	Temperature measurement with 9 measuring points at a specified test temperature, including certificate	14, 16, 17, 18	DL30-0109

* Notes › See last page

Designation	Description	*	Art.-No.
Validation services			
Execution of IQ/OQ	Execution of IQ/OQ in accordance with qualification folder	15, 18	DL41-0200
Execution of IQ/OQ/PQ	Execution of IQ/OQ/PQ in accordance with qualification folder	15, 18	DL44-0500
Warranty service			
Warranty extension from 2 to 3 years	The warranty is extended from 2 to 3 years from the delivery date, wear parts are excluded	–	DL01-8041
Warranty extension from 2 to 5 years	The warranty is extended from 2 to 5 years from the delivery date, wear parts are excluded	–	DL01-8042

* Notes › See last page

Climate chambers series KB with package P for lithium-ion energy storage system tests

KB-P

The test chambers for energy storage systems from BINDER for carrying out aging and performance tests (package P) offer maximum user convenience and comply with **EUCAR Hazard Level 4.**
Within a manufacturing process, the KB series climatic chamber is perfectly suited for **forming of the cells.**

FORMING IN CLIMATE CHAMBERS SERIES KB

An important and final production step in the manufacture of a lithium-ion cell is formation. At this point the cell is charging and discharging for the first time and boundary layers there are inside the cell between the electrolyte and the active material. In addition, a quality control step can be performed simultaneously by a further charging and discharging process. The forming process can take up to 2 days.

PERFORMANCE AND AGING TESTS

Calendar and cyclic aging tests are carried out. With calendar aging, the behavior of the energy storage system e.g. with different capacities across some or all of the lifetime of the energy storage system at different temperatures. During cyclic aging, the lifetime is determined in relation to the charging and discharging process of the energy storage system.

THE POWERFUL ALLROUNDER IN CLIMATE CHAMBERS

Important features of the KB series with package P:

- Perfectly suited for temperature tests between 0°C and 100°C
- Best price-performance ratio
- Compact dimensions compared to other models
- Solution request via BINDER INDIVIDUAL
- Small footprint - for small setup area
- Space-saving solution possible

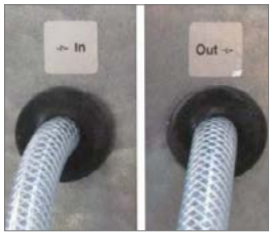
Model KB 400 with package P

YOUR ADVANTAGES AT A GLANCE

Class 2 independent temperature safety device when temperature is set to 120°C.

Door-locking mechanism with strong closing brackets on the side

Pressure relief flap with an additionalrelieving spring as a safety measure in the event of faults



Inert gas connections for flushing (e.g., for nitrogen)

KB-P

TEST CHAMBER FOR ENERGY STORAGE SYSTEMS SERIES KB - MODEL SELECTION AND TECHNICAL DATA

Model	KB 53	KB 115	KB 240	KB 400	KB 720
Housing dimensions not including attachments and connections *Width x Height x Depth [mm]*	635 x 835 x 580	835 x 1025 x 650	925 x 1465 x 800	925 x 1950 x 805	1250x 1952 x 885
Internal Dimensions *Width x Height x Depth [mm]*	400 x 400 x 330	600 x 480 x 400	650 x 785 x 485	650 x 1270 x 485	970 x 1250 x 576
Interior volume [L]	53	115	247	400	698
Footprint [m²]	0,13	0,54	0,74	0,74	1,10
Temperature range	-5...100	--5...100	-5...100	-5...100	-5...100
Humidity range	–	–	–	–	–
Number of shelves (Std./max.)	2/4	2/5	2/9	2/15	2/15
Load per rack [kg]	15	20	30	30	45
Permitted load [kg]	40	50	100	100	100
Heat compensation at 40°C [W]	100	150	300	500	500

– not available

ACCESS PORTS SERIES KB

Model	**Top** possible size [mm]	**At side (left/right)** possible size [mm]	**At back** possible size [mm]
KB 53	–	–	10, 30, 50
KB 115	–	–	10, 30, 50
KB 240	10, 30, 50	10, 30, 50	–
KB 400	10, 30, 50	10, 30, 50	–
KB 720	10, 30, 50	10, 30, 50	–


Access ports for cables and power cables.

Precise positioning in almost all sizes and locations is possible in consultation with our BINDER INDIVIDUAL department. Access ports available in silicone or stainless steel.

FURTHER ADAPTATIONS SERIES KB

Program sequence display using indicator lamps

Electromechanical door lock mechanism controlled in aprogram and/or manually

Additional access ports available in almost all sizes and locations

Telescopic rails for easier loading of the chamber

STANDARDS

UN 38.3 | IEC 62660-1 | IEC 62660-2 | IEC 62660-3 | IEC 61960 | IEC 62133 | UL 1642 | UL 2054 | SAE J2464

OTHER BINDER MODELS FOR LITHIUM-ION TESTS

1. Aging and performance tests
BINDER offers test chambers for aging tests with a standardized package A and a more advanced package P for Performance and aging tests. The following models can be equipped by our BINDER INDIVIDUAL department with package A and P:

Series	56	115	240	400	720	1020
MK	•	•	•	–	•	–
MKF	•	•	•	–	•	–
MKT	–	•	•	–	•	–
MKFT	–	•	•	–	•	–
KB	•	•	•	•	•	–
KBF	–	•	•	–	•	•
KMF	–	•	•	–	•	•
KBF-S	–	–	•	–	•	•

• Available – not available

Model MK 240 with package P

2. Drying & vacuum drying in the manufacturing process
In the manufacturing process of the lithium-ion cell, components are dried. Our vacuum drying ovens series VD and series VDL as well as our drying oven Series FED are suitable for this.

EXPLANATION EUCAR HAZARD LEVEL

The failures which result from the cell or module are classified in hazard levels. The hazard levels according to EUCAR (European Council for Automotive R&D) offer an orientation. Operators define the hazard classification for the risk of their test objects and the test system/test equipment is then designed in the appropriate safety class.

Hazard classification	Description	Classification Criteria & Effect		
0	No effect	No effect. No loss of functionality	Paket A	Paket P
1	Passive protection activated	No defect; no leakage; no venting, fire, or flame; no rupture; no explosion; no exothermic reaction or thermal runaway. Cell reversibly damaged. Repair of protection device needed	Paket A	Paket P
2	Defect/Damage	Same as Hazard classification 1; however, the cell is damaged irreversibly and it must be replaced	Paket A	Paket P
3	Leakage mass ‹ 50 %	No venting, fire, or flame; no rupture; no explosion. Weight loss ‹ 50 % of electrolyte weight (electrolyte = solvent + salt)		Paket P
4	Venting mass › 50%	No venting, fire, or flame; no rupture; no explosion. Weight loss ‹ 50 % of electrolyte weight (electrolyte = solvent + salt)		Paket P
5	Fire or Flame	No rupture; no explosion (i.e., no flying parts)		
6	Rupture	No explosion, but flying parts of the active mass		
7	Explosion	Explosion (i.e., disintegration of the cell)		

Operator is responsible for ultimate safety measures

EXPLANATION PACKAGE A

FOR AGING TESTS
Solution:
Cells and modules are tested at different temperatures always without a current supply in order to assess Aging during storage.

EXPLANATION PACKAGE P

FOR AGING AND PERFORMANCE TESTS
Solution:
Cells and modules are tested at different temperatures with and without a current supply to measure performance.

TIPS AND TRICKS AND EXAMPLE OF APPLICATION

Aging and performance test for cells and modules for lithium batteries (TÜV SÜD, Germany)

Extensive performance tests are carried out in order to determine the performance of the cells and modules (safety package P). The components are therefore brought to the limits of their performance and load capacities by exposing them to constantly changing temperatures, with and without a current. The test object is exposed, for example, to temperatures of -10 °C to 55 °C in the cooling incubator under continuous temperature changes.

Read more
› go2binder.com/en-TUEV-SUED-Battery-Testing


Source: TÜV SÜD


Source: TÜV SÜD

Battery research (Car manufacturer, Germany)

The University of Warwick in the UK is successfully using BINDER simulation chambers from Tuttlingen in its research work. The newly founded Energy Innovation Centre, part of the International Automotive Research Centre (IARC), is working on the development of batteries for hybrid and electric vehicles. The aim is for batteries to be made more efficient in the near future, and for this reason scientists also need ever better climate chambers. So, with BINDER chambers, they have most likely found exactly the product they need, "Because the more powerful the batteries become, the more dangerous the tests in the laboratory. The scientists therefore need absolute safety," says Mark Amor-Segan, engineer at the new test center. In the new video interview on the "Select Science" website, the scientist emphasizes that safety will become even more important in the context of battery tests over the next few years.

See more:
› https://youtu.be/a9nr-l8snBg


Source: University Warwick

Forming (WWU/MEET, Germany)

In use are climatic chambers of the KB series, which are used for forming. Drying ovens of the FED series are also used to dry components of the lithium-ion cell al well as accessories like gloves, for example.


Source: © WWU/MEET

Wolf Laboratories Limited

www.wolflabs.co.uk

Wolflabs

Tel: 01759 301142 Fax:01759 301143 sales@wolflabs.co.uk

Use the above details to contact us if this literature doesn't answer all your questions.

Pricing on any accessories shown can be found by keying the part number into the search box on our website.

The specifications listed in this brochure are subject to change by the manufacturer and therefore cannot be guaranteed to be correct. If there are aspects of the specification that must be guaranteed, please provide these to our sales team so that details can be confirmed.