

# Bedienungsanleitung Operating Instructions Mode d'emploi

Schüttler / Shaker / Agitateur, KM

KM CO<sub>2</sub>  
KM CO<sub>2</sub>-FL

KM 2

KM 2 AKKU



Operating Instructions  
**Shaker KM**

Thank you for having chosen an original Bühler product.

**KM CO<sub>2</sub>**  
**KM CO<sub>2</sub> - FL**

**KM 2**

**KM 2 AKKU**



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The original version of these operating instructions is in German.  
Subject to technical alterations and mistakes.

## 1. General Notes

You have chosen a Bühler high-quality product for supporting you in your work. All Bühler shakers were developed for the use in laboratories in a neutral environment. To ensure a long life and optimal operation of the device we recommend to observe the following points.



Read the operating manual carefully before initial operation.



The user must acquaint himself with the safety instructions and operating conditions in order to avoid damage / injuries to material and personnel.



Liability and all claims under warranty end immediately in case of damages which result from misuse and / or abuse.



The devices were carefully checked for perfect functioning and condition before delivery.



Necessary servicing or repair work may only be done by

- personnel of the manufacturer (Edmund Bühler GmbH)
- their authorized agents
- personnel trained by Bühler



For shipping, the device must be adequately and safely packed. If possible, use the original packing.



If the device is returned to Bühler for repair, it should be cleaned and free from any harmful substances or residues.

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## 1.1 General Notes concerning areas of application and mode of operation

The devices can be used in all laboratory fields in which it is necessary to mix and shake homogeneously under constant and defined conditions.

### Areas of Application (Examples)

- Homogeneous mixing of different liquids as well as of solid and liquid components (e.g. nutrient solutions)
- Shaking of kits for diagnostic tracing reactions
- Solvent extraction of different phases in separating funnels for chemical investigations
- Evenly changing agitation of liquid phase (nutrient solutions) or gaseous phase (cell culture in Petri dishes)
- Coloring and decoloring of gels

Thanks to their different motions and high loading capacities, and especially their variable „Combifix“ rack systems, Bühler shakers offer solutions both for general as well as individual shaking tasks.

For keeping the samples at constant temperatures, the shaker models SM 30, KS 15 and TiMix 5 can be equipped with an additional incubator hood.

Temperature range: +5°C above ambient up to +50°C, optionally up to +60° C. A cooling coil for connection of an external flow-through cooler is available as an option (TH 30).

Incubator Hood TH 15 (Order No. 6161 000)

Incubator Hood TH 30 (Order No. 6162 000)

In case of enquiries please contact the Export Sales Department

Phone: +49 74 71 / 98 64 - 0

Fax: +49 74 71 / 98 64 - 75

e-mail: info@edmund-buehler.de

## 1.2 Safety Instructions



When shaking aggressive liquids / substances there is a risk of injuries caused by splashing or spilling. Work with adequate protective equipment only. In general, avoid splashing by choosing a suitable shaking speed.



Due to the movements of the device there is danger of clothing or body parts getting caught. During operation pay attention that neither clothing nor jewellery get into contact with moving parts.

## 2. Transport Instructions

Safe transport of the devices is only ensured if original packaging is used. If they are bumped hard or put down roughly, damages can occur.



Do not lift the devices at the shaking plate (tray)!  
Transport the devices by holding them at the housing only!

## 3. Installation and Connection

Place the shaker on a level, smooth and firm surface so that it stands firmly also at high shaking frequencies. For connection requirements and operating voltage see technical data as well as the rating plate at the back of the device.



The system may only be connected to a mains with protection earth!



When installing the devices make sure that they are protected against splash water.

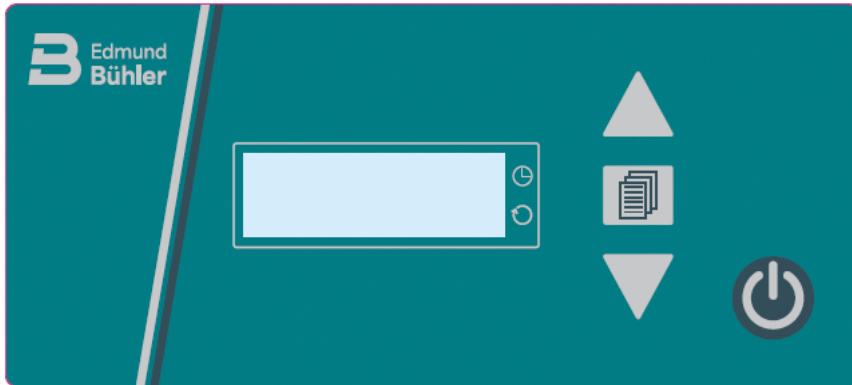






The safety distance between the device and other instruments or a wall must be chosen in such a way that the shaking plate is freely movable and that the operating personnel cannot be injured when the shaker is switched on or during operation.

If other tasks are performed by personnel in immediate vicinity of the shaker, the shaker must be switched off for reasons of safety.

## 4. Operating the models

### 4.1 Control panel and buttons

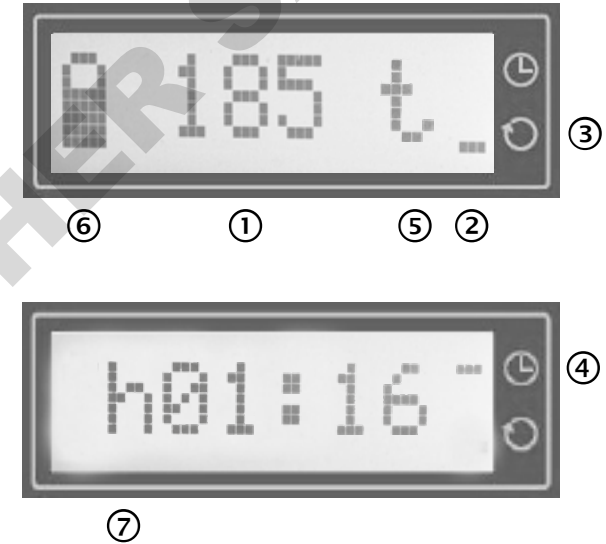


	Scroll button to scroll through the display during the shaking process
	„Up“ arrow button to increase the speed or runtime
	„Down“ arrow button to decrease the speed or runtime
	On/Off button to switch the device on/off and to stop the shaking motion



The speed is set in increments of 5 revolutions per minute (rpm).  
The running time is specified in minutes and seconds or hours and minutes (with running times over 1 hour).  
The maximum possible running time which can be set is 99 h 59 min.

### 4.2 Display layout




1	Actual value for speed, runtime and state of charge (only with KM 2 Akku)
2	Selected display value (speed or remaining runtime)
3	Speed display selected
4	Runtime display selected
5	Flashing symbol „t“ when the runtime is set
6	State of charge display (only with KM 2 Akku)
7	Runtime display in hours and minutes





### 4.3 Operating the devices

The KM 2, KM 2 Akku, KM CO<sub>2</sub> and KM CO<sub>2</sub> - FL devices have a modern touch technology.  
The devices are operated by touching the buttons on the front foil.









#### 4.4 Starting the device

The device is started by touching the  button for at least 2 seconds. The device type is shown in the display during the initialisation process. The device is ready for operation at the end of the startup routine. You are now in the speed menu. The set value for the speed is 0 rpm after switching on. The remaining runtime is also set to 00:00 (= continuous running).

#### 4.5 Setting the speed

The speed is decreased or increased by pressing the ,  buttons. Changes to the target value are saved immediately. If the  button is pressed for an extended period, the speed changes to 0 rpm. If the  button is pressed during the shaking process, it stops immediately and the remaining runtime is set to 0.

#### 4.6 Setting the runtime

The runtime menu is called up by pressing the  button. The value is decreased or increased by pressing the ,  buttons. The value is increased in steps of 10 s when the  button is pressed for an extended period for the first time, and in steps of 1 s at first for fine adjustment when it is pressed again for an extended period. When the  button is pressed for an extended period, the value is decreased in steps of 1 s at first. The time is shown in mm:ss. If the set value is greater than 1 hour, the display changes to hh:mm and this is indicated by a „h“ in the display. The set target value is started and stored by pressing the  button. By touching the  button the last value which was stored is displayed. By touching the button again the time value is set to 00:00. With the KM 2 and KM CO<sub>2</sub> devices, the speed menu is called up by pressing the  button. With KM 2 Akku devices, the state of charge of the battery is firstly shown as a percentage. Pressing again takes you back to the speed menu. An activated runtime is shown in the speed menu via a flashing „t“.

#### 4.7 Switching the device off

The device is switched off by touching the  button for 2 seconds whilst the device is active.

### 5. Operating modes

#### 5.1 Operating mode with battery

The shaker KM 2 battery is supplied with a charged battery pack. Prior to initial operation, the charge level of the battery pack should be checked and recharged if necessary.

In particular, when the battery-shaker wasn't used for a longer time, the charge level of the battery pack should be checked and recharged if necessary.

To recharge the battery pack use only the supplied Power adapter. The full capacity is reached after approx. 5 hours charging time. The achievement of the full charge capacity is indicated by the LED on the charger. During charging, the LED lights red, after the full charge capacity is reached, the LED turns green.

To extend the lifetime of the batteries, we recommend to connect the battery shaker to the power adapter during longer times without operation. The battery pack will not be damaged by this procedure.

To protect the battery against deep discharge, the battery-shaker shuts off automatically when reaching the minimum capacity. In this case, the shaker has to be switched off at the main switch. Then connect the power adapter and switch on the shaker again.



Higher ambient temperatures will reduce the lifetime of the batteries. Therefore ambient temperatures above 45° C have to be avoided.

Significantly reduced working hours of battery shaker indicate that the battery pack must be replaced.

To replace the battery pack first disassemble the rack system, then disassemble and remove the upper housing part. Then remove the cable from the battery pack. After releasing the green rubber bands, the batteries can be removed.



#### **Do not dispose used batteries into the garbage!**

Disposal of used batteries must be done through a local disposal system

## 5.2 Operating with power adapter

The charger can also be used as power supply for the battery-shaker. The battery-shaker can then be used in continuous operation



The battery shaker can be used in ambient temperatures from + 4° C - + 45 ° C in normal atmosphere



The system may only be connected to a mains with protection earth !

## 6. Maintenance and Servicing Instructions

The devices are maintenance-free; excessive soiling should be avoided.

In case of failure, please contact the Technical Service Department of the Edmund Bühler GmbH.

### Edmund Bühler GmbH Technical Service Dept.

Schindäckerstraße 8  
72411 Bodelshausen

Phone: +49 7471 / 9864-0

Fax: +49 7471 / 9864-75

e-mail: info@edmund-buehler.de

## 7. CE Declaration of Conformity

We,

### Edmund Bühler GmbH

Schindäckerstraße 8  
72411 Bodelshausen

Manufacturers of this product, declare under our sole responsibility that this products corresponds to the EC directives 2006/42/EG (machinery directive), 2014/35/EU (low-voltage directive) and 2014/30/EU (EMC directive).

The following harmonised standards apply:

EN 61 010; EN 55 014; EN 60 204

Responsible for the documentation:

Tobias Neher (Engineer)

Schindäckerstraße 8  
72411 Bodelshausen

Edmund Bühler GmbH

## 8. Warranty

The Edmund Bühler GmbH warrants that this device has the properties guaranteed by contract and that it does not have any defects which rescind its value or its use for customary and usual applications or applications foreseen by the contract. (See General Terms and Conditions of the Edmund Bühler GmbH).

The warranty period ends 24 months after delivery (date of invoice).

The warranty does not include wear parts. Excluded from warranty are malfunctions caused by misuse or improper use, installation, or maintenance.

Warranty ends immediately if the device is subjected to technical modifications which are not authorized **in advance** by Edmund Bühler GmbH.

## 9. Technical Data

	KM 2	KM 2 Akku	KM CO <sub>2</sub> / KM CO <sub>2</sub> - FL
Article number	6113 000	6135 000	6136 000 6137 000
Shaking motion	orbital	orbital	orbital
Shaking platform (w x d) mm	200 x 295	200 x 295	200 x 295
Max. load	max. 2 kg	max. 2 kg	max. 2 kg
Shaking speed	5 - 220 rpm	5 - 220 rpm	5 - 220 rpm
Stroke	20 mm	20 mm	20 mm
Runtime	1s - 100 h / ∞	1s - 100 h / ∞	1s - 100 h / ∞
Battery service life	-	min. 40 h	-
LED display	Shaking speed and runtime	Shaking speed, runtime and charge state	Shaking speed and runtime
CO <sub>2</sub> concentration	5 %	5 %	20 %
Relative humidity	~ 95 % non-condensing	~ 95 % non-condensing	~ 95 % non-condensing
Ambient temperature	4° C bis 45° C	4° C bis 45° C	4° C bis 45° C
Electrical supply	100 - 240 V, 50/60 Hz	100 - 240 V, 50/60 Hz	100 - 240 V, 50/60 Hz
Enclosure protection	IP 21	IP 21	IP 21
Heat emission	approx. 0.5 - 2 W	approx. 0.5 - 2 W	approx. 0.5 - 1.5 W
Dimensions (w x d x h)	250 x 415 x 145	250 x 415 x 145	230 x 340 x 145
Weight	8,1 kg	10,5 kg battery charger: 220 g	7,6 kg control unit: 400 g

## 10. Basic Equipment

Miniature Shaker KM 2	Basic device incl. basic platform (0007 622) and rubber mat Operating Instruction KM (0091 005)
Miniature Shaker KM 2 Akku	Basic device incl. basic platform (0007 622) and rubber mat, battery charger / power unit Operating Instruction KM (0091 005)
CO <sub>2</sub> - Shaker KM CO <sub>2</sub>	Basic device incl. basic platform (0007 622) and rubber mat External control unit with connecting cable Operating Instruction KM (0091 005)
CO <sub>2</sub> - Shaker KM CO <sub>2</sub> - FL	Basic device incl. basic platform (0007 622) and rubber mat External control unit with flat ribbon cable Operating Instruction KM (0091 005)

## 11. Rack Systems and Loading Capacities

### 11.1 Rack Systems and accessories

#### Universal tray KM

For secure fastening of Erlenmeyer flasks, round bottom flasks, or beakers in single stainless steel spring clamps.

The drillings (28.3 mm apart) ensure flexible loading with stainless steel spring clamps. The tray is placed on the integrated basic tray and fixed.

The coated tray is proof against aggressive liquids.

Universal Tray KM, without spring clamps

Size 356 x 300 mm

**Order No. 0052 030**



#### Universal tray KM Mini

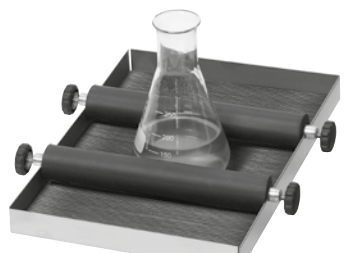
Size 200 x 295 mm  
without spring clamps

**Order No. 0052 119**



#### Clamping Strips KM for basic tray

**Order No. 0052 115**



#### Spring clamps (stainless steel) for universal trays.

The sizes are related to Erlenmeyer flasks, but are also suitable for round bottom flasks, beakers, etc.

Size	10 ml	<b>Order No. 0009 642</b>
Size	25 ml	<b>Order No. 0009 643</b>
Size	50 ml	<b>Order No. 0009 644</b>
Size	100 ml	<b>Order No. 0009 645</b>
Size	250 ml	<b>Order No. 0009 646</b>
Size	500 ml	<b>Order No. 0009 647</b>
Size	1000 ml	<b>Order No. 0009 648</b>
Size	2000 ml	<b>Order No. 0009 649</b>
Size	3000 ml	<b>Order No. 0009 653</b>
Size	5000 ml	<b>Order No. 0009 652</b>

#### Test tube racks, stainless steel

The test tube racks can be fastened either on the standard rack system between the clamping strips h, or they can be screwed on the universal tray by means of a hinged foot. With this foot it is possible to vary the angle of inclination of the test tubes. With:

**44 holes à 14 mm Ø**  
**Order No. 0052 056**

**44 holes à 16 mm Ø**  
**Order No. 0052 057**

**44 holes à 18 mm Ø**  
**Order No. 0052 058**

**14 holes à 30 mm Ø**  
**Order No. 0052 201**

**Hinged foot for test tube racks,  
stainless steel**  
**Order No. 0052 059**

### 11.2 Loading Capacity of rack system with clamping strips

	Size	Qty (pcs)
<b>Erlenmeyer flasks</b>	10 ml	20 <sup>1)</sup>
	25 ml	16 <sup>1)</sup>
	50 ml	12 <sup>1)</sup>
	100 ml	9 <sup>2)</sup>
	250 ml	6 <sup>2)</sup>
	500 ml	2 <sup>3)</sup>
	1000 ml	2 <sup>3)</sup>
	2000 ml	1 <sup>4)</sup>
	3000 ml	1 <sup>4)</sup>
	5000 ml	-
<b>Test tube racks</b>		1

<sup>1)</sup> with 5 clamping strips h (0052 115) additional

<sup>2)</sup> with 4 clamping strips h (0052 115) additional

<sup>3)</sup> with 3 clamping strips h (0052 115) additional

<sup>4)</sup> with 2 clamping strips h (0052 115) additional

### 11.3 Loading Capacity of Universal Tray KM Mini (200 x 295 mm)

	Size	Qty (pcs)
<b>Spring clamps</b>	10 ml	23
	25 ml	15
	50 ml	15
	100 ml	7
	250 ml	4
	500 ml	2
	1000 ml	1
	2000 ml	1
	3000 ml	-
	5000 ml	-
<b>Test tube racks (with hinged foot)</b>		1

### 11.4 Loading Capacity of Universal Tray KM (356 x 300 mm)

	Size	Qty (pcs)
<b>Spring clamps</b>	10 ml	60
	25 ml	30
	50 ml	30
	100 ml	16
	250 ml	12
	500 ml	9
	1000 ml	5
	2000 ml	2
	3000 ml	-
	5000 ml	-
<b>Test tube racks (with hinged foot)</b>		3



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[www.edmund-buehler.de](http://www.edmund-buehler.de)  