Edmund Bühler GmbH
Since 1880

Bedienungsanleitung
Schüttler

Operating Instructions
Shaker

Mode d'emploi
Agitateur

VERSION 07 / 2019

KS 15 control
SM 30 control

TiMix 5 control
VKS 75 control

Art.-Nr. 0091000

Operating Instructions

Shaker

GB

Thank you for having chosen an original Bühler product.

KS 15 Control
SM 30 control
TiMix 5 control
VKS 75 control

Contents

GB

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.

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

Tel.: +49 74 71 / 98 64 - 0
Fax: +49 74 71 / 98 64 - 75
e-mail: info@edmund-buehler.de

GB

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.

The maximum permissible shaking speed depends on the load. See chapter 11 for max. shaking speeds.

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.

The shaker models VKS 75 are designed for floor operation only.
We strongly recommend to fasten the fixing rings which are included in the delivery to the floor.
They prevent the shaker from shifting during operation.

4. Operation of the Models

4.1 Operating Panel and Keys

Stop key
Stops the shaking task

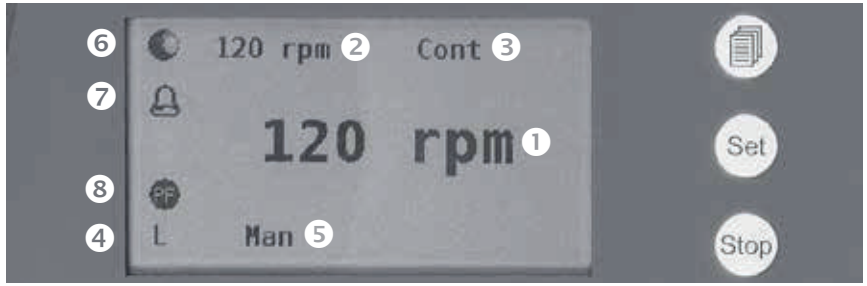
Set key
Starts the configuration mode

Page key
Serves for changing the display
during the shaking task and programming

Rotary switch with OK function
Setting of values for speed and time
by turning the switch, confirmation by pressing it
Change of operating mode and start of configuration menu by pressing the key for approx. 2 sec.

The setting of the speed is done in steps of 5 rpm, or 10 rpm respectively (TiMix5 Control). The time can be set in minutes and seconds, or hours and minutes (when exceeding 1 h).
The max. possible operation with timer is 99h 59min.

4.2 Display Layout



1	Actual value of speed or time
2	Set value of speed or time
3	Display of speed or remaining time (additional information)
4	Direction of rotation
5	Operating mode or chosen menu
6	Status symbol, indicates the actual operating status. This symbol assumes different forms
	Single circular ring: Indicates that a segment or program is not yet fully programmed.
	Filled circle: Segment or program is programmed, i.e. set values are completely stored.
	Flashing circle: The circle flashes when the “change mode“ is started.
	Circular ring (turning): Indicates that the shaking process is active.
7	Symbol for activated alarm
8	Symbol for activated power fail function

GB

4.3 ON/OFF Switch

The shakers KS15 control, TiMix5 control, SM 30 control, and VKS 75 control are equipped with an ON/OFF switch which is located at the right side of the device.

4.4 Operating Modes

2 operating modes can be selected.

4.4.1 Manual Operating Mode

In this mode, the set values of speed and time are entered manually by means of the rotary switch. The values can be changed at any time during the shaking process. The set values remain stored when the shaking process is completed.

4.4.2 Automatic Operating Mode

In this operating mode, customized shaking programs can be stored. A shaking program consists of different segments. A segment is defined by speed, time, and direction of rotation. See chapter 6 for a detailed description of this mode.

4.5 Start of the Device and Selection of Operating Mode

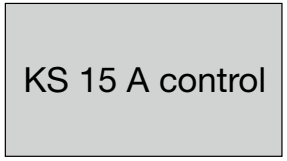
The device is switched on at the ON/OFF switch at the right side of the unit.
A start routine and a self-test follow. During the start routine, the following information is displayed for 1 -2 sec each:

- Logo of the Edmund Bühler company
- Type of shaker
- Software version

The desired operating mode can be selected via the mode function.

Example

For approx. 1 to 2 seconds,
the Edmund Bühler logo is displayed.

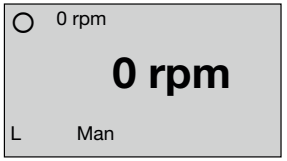


Then the shaker model is displayed for approx. 1 to 2 seconds
(here: model KS 15 A Control).

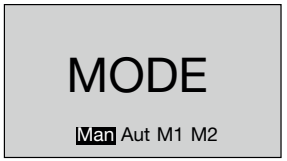
Finally, the software version is displayed for approx. 1 to 2 seconds.

When the start routine is completed, the shaker is in the operating mode which was active before the unit was switched off.

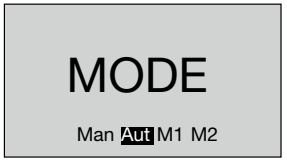
In this example, the operating mode “manual” was active before the device was switched off.



The device is in „manual“ operating mode.
The speed display shows the actual and set values (=0). The single circular ring indicates that no set value has been selected.



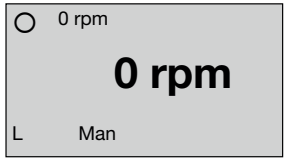
Press the OK key for 2 seconds to change to the „Mode“ display. The manual mode is displayed inversely; it was last activated.
Turn the rotary switch OK to select a different mode. The selected mode or menu is always displayed inversely.



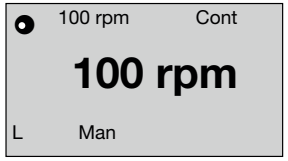
By pressing the OK key the selected mode (e.g. automatic) or menu is activated.

GB

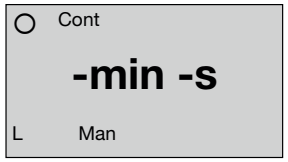
5. Manual Operating Mode



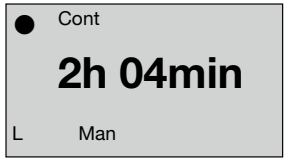
When the device is switched on, it is in manual mode. The speed display shows the actual and set values (=0). The direction of rotation is displayed at the lower left. The direction can be selected in the M1 menu by the operator (see chapter 6.8).
The single circular ring indicates that no set value has been selected.



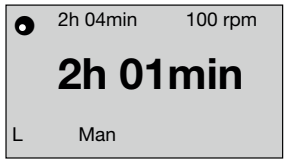
By turning the rotary switch (OK) the device starts running and reaches the set speed by means of a ramp function.
The circular ring indicates that the shaker is in operation.
At the upper right „Cont“ (continuous) is displayed, i.e. the shaker is running in continuous operation.



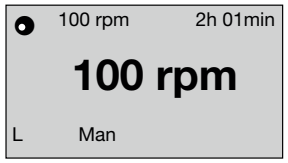
Press the page key to change to the time display. „Cont“ is displayed for the set value, i.e. the shaker is running continuously. The main display shows -min –s.



Turn the rotary switch (OK) to select the running time.
If the running time surpasses 59min 59s, the time display switches from „mm ss“ to mode „hh mm“.
The max. possible operation with timer is 99h 59min.



When the (OK) key is pressed, the time in the main display runs backwards and the circular ring appears.
The set value is displayed at the upper left.
The circular ring indicates start of the timer. The actual value of the speed is dispayed at the upper right.



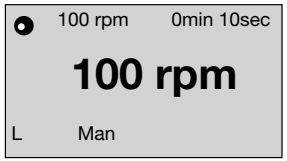
Press the page key to return to the speed display.
The remaining time is displayed at the upper right.

The shaking process can be stopped at any time by pressing the Stop key.
The set values for speed and time remain stored.

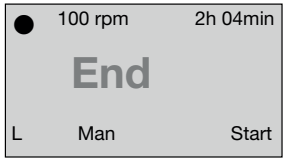
The shaking process can be restarted by pressing the (OK) key.
The running time starts again at the beginning.

In case of a short stop during a shaking process (e.g. when an additional flask is placed on the shaker) it is recommended to turn the set value of the speed to „0“ with the rotary switch, then add the flask, and readjust the set value to the original value. The running time is not interrupted during this stop.

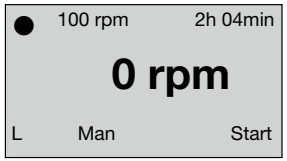
Example



The shaking process is almost finished (remaining time 10 sec.)



The shaking process is finished.
For approx. 10 sec., „End“ is blinking on the display. Additionally, an acoustic signal is given for approx. 10 sec. This signal can be deactivated in menu M1 (see chapter 6.8)



After approx. 10 sec., or when the (OK) key is pressed during the alarm signal, the display changes. The set values for speed and time are displayed in the upper line. The shaking process can be started again with these values by pressing the (OK) key.

GB

5.1 Reset and Change of Set Values

In the manual operating mode, the set values for speed and time can be changed while the shaker is halted, or during a shaking process.

5.1.1 Change of Set Values When Shaker is Stopped

Use the page key to change into the respective display for speed or time.
Now the corresponding set value can be changed by means of the rotary switch OK.
For safety reasons, the speed is set to 0 rpm first when the rotary switch is turned to the left (counter-clockwise) in the speed display. A new set value for speed can be selected by turning the rotary switch to the right (clockwise). This procedure must be followed when the new speed value is lower than the previously set value.

The shaker starts immediately after a set value for the speed is selected.

In the time display, the set value can be changed by turning the rotary switch to the left (anti-clockwise; -) or right (clockwise; +).
The new set value for time must be confirmed by pressing the OK key.
Reset to zero of the respective set values: Press the Set key.

5.1.2 Change of Set Values While Shaker is Running

In the speed display, the set value of the speed can be changed by turning the rotary switch to the left (anti-clockwise; -) or right (clockwise; +).

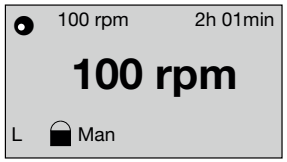
In the time display, cancel the set value for the running time, first, by pressing the Set key. The shaker does not stop. Now select a new set value with the rotary switch and confirm by pressing the OK key.

If the time value is cancelled by pressing the Set key while the shaker is running, the device continues in the continuous mode.

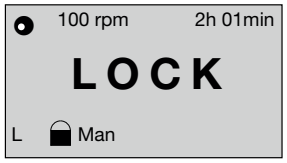
5.2 Key Lock

This function serves for locking the rotary switch against a change of the set values, as well as the keys and Set during operation.
Inadvertent changes of the set values or faulty operation can be avoided.
The stop key Stop cannot be locked.

Example



During the shaking process the above mentioned key functions can be locked by pressing the OK key.
Changes of the set values are not possible. The locking function can be cancelled by pressing the OK key again. The key lock is indicated by a lock symbol.



If the rotary switch is turned or if the keys Set or are pressed while the lock function is activated, LOCK is displayed for approx. 1 sec. The locking function can be cancelled by pressing the OK key.

GB

6. Automatic Operating Mode

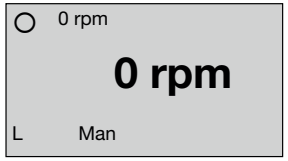
The operating mode „Automatic“ allows defined shaking programs. These shaking programs consist of single, defined segments. A segment is defined by speed, time and direction of rotation. Thanks to this mode, reproducible shaking tasks are possible.

In total, 10 different programs (P0 – P9) can be defined which, in turn, can consist of up to 10 segments (S0 – S9) each.

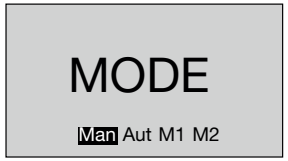
A speed of „0“ can also be set to define a pause or stand-still during the shaking process.

The operating mode „Automatic“ is activated as described below.
Assumption in our example: The operating mode „Manual“ was active before the device was switched off.

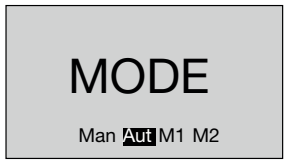
Example



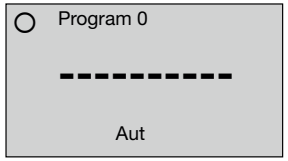
The device is in the manual operating mode. The speed display shows the set and actual values (=0).
The single circular ring indicates that a set value has not yet been selected.



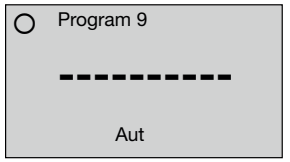
Press the OK key for 2 sec., then the MODE display appears. The manual mode is inverted because it was last activated.
Turn the rotary switch OK to select a different mode.



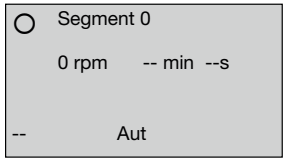
Press the OK key to activate the selected mode (here: Automatic).



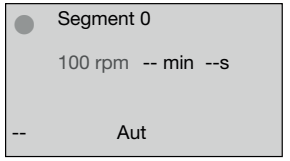
Program no. 0 appears on the display.
The ten bars stand for the maximum 10 segments which can be defined for this program.
Here none of the segments is defined yet.
A program can only be defined when at least 1 segment has been defined



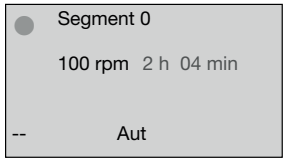
Turn the rotrary switch to change to the following programs; in this example, down to program no. 9.



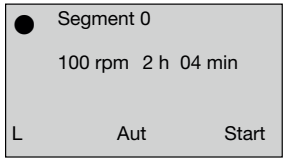
Turn the rotary switch again. Now the segment display is active. In this display, the segment number (0 – 9) and all definable parameters are shown. The set values are 0 or not selected. This is also indicated by the single circular ring at the upper left.



Press the Set key to enter the change mode.
The circle flashes, as does the speed display.
Turn the rotary switch OK to select the set value for the speed and confirm by pressing the OK key.



Now the time display is flashing. Select a set value by turning and pressing the OK key (same as for the speed). The same applies to the selection of the direction of rotation (lower left). When turning the rotary switch, the display changes continuously between R and L. Select the desired direction of rotation and confirm with the OK key.
After this confirmation the set value for the speed starts flashing, etc.

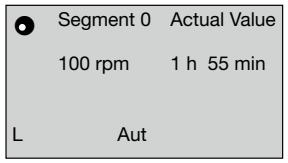


When all parameters have been selected, press the Set key to leave the change mode.
The circle stops flashing, and „Start“ appears at the lower right. The segment can now be started by pressing the OK key.

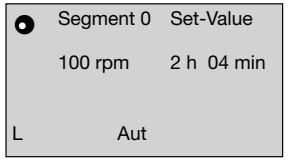
In the automatic operating mode it is imperative that a time value is selected. Continuous operation is not possible.

GB

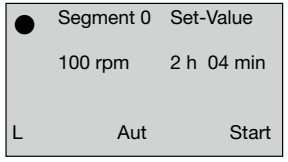
6.1 Starting a Segment



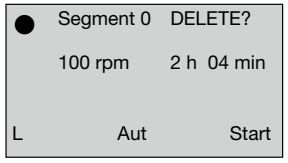
Start the segment by pressing the OK key. All actual values are displayed. A circular, turning ring appears at the upper left. Next to it, the segment number and “actual value” are displayed.
The time is running down and shows the remaining shaking time.
The unit (rpm) of the actual value for the speed is flashing until the set value is reached.



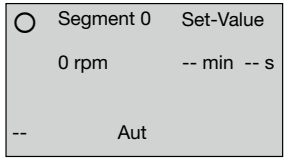
Press the page key to change to the display of the set values.
The circular turning ring indicates that the shaking process is active.
Press the page key again to change to the display of the actual values, etc.



The shaking process can be stopped by pressing the Stop key. The display shows all set values.
The circular ring changes into a filled circle.



To delete all set values for the segment, press the Stop key for 2 sec.
In the display the prompt for confirmation „DELETE?“ appears. Confirm with the OK key.
If you do not wish to delete the values, press the Stop key again. The set values remain stored and displayed.
When the prompt for confirmation DELETE? appears and no key is pressed for 5 sec., the display changes automatically to the standard program display. The “delete” process must be started anew.

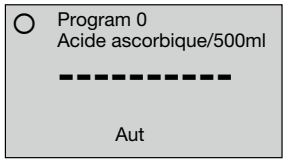


After confirmation of the delete process all set values are reset to 0 or not selected. The single circular ring is displayed instead of the filled circle.
Press the set key Set again to enter set values, as described above.

Alternative to deletion of all set values by means of the DELETE function:
Delete each set value separately by turning the rotary switch to the left (counter-clockwise) to „0“.
If the set value for speed is set to “0”, the display of the direction of rotation disappears.

6.2 Programming a Shaking Program

A shaking program can consist of up to 10 segments.
Before a shaking program can be defined, different segments have to be defined, first (see chapter 6).
Assumption for the following example:
Segments 0 – 9 have been programmed and are available for editing shaking programs.

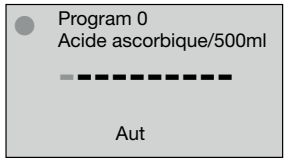


After activation of the device select the operating mode „Automatic“ as described earlier.
Program no. 0 appears on the display.
The 10 bars stand for the maximum of 10 segments which can be defined for this program.
In our example the program is not yet defined.

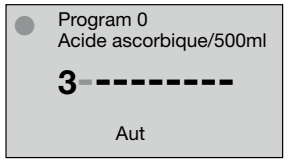
A name has been allocated to the program in our example. This functionality is only possible in combination with a personal computer. It requires the USB interface option.

GB

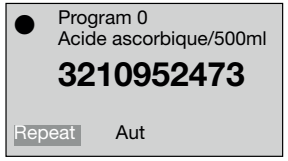
Example



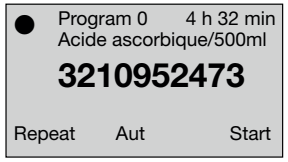
Press the set key (Set) to enter the change mode.
The single circular ring changes into a flashing circle, and the first bar for the first segment flashes.
Turn the rotary switch. Instead of the bar the numbers of all defined segments will appear. In our example numbers 0 to 9. After number 9 the bar reappears, then number 0 etc.



Select the desired segment number with the rotary switch and confirm by pressing the (OK) key.
The selected number is permanently displayed, and the second bar is flashing.
Select the second segment in the same way.



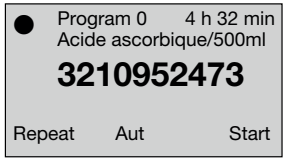
When the 10th and last segment is programmed, „Repeat“ is displayed at the lower left.
Turn the rotary switch until the inverted display is flashing. In this mode, the complete program will be repeated endlessly until the (Stop) key is actuated.
When the rotary switch is turned again, the first digit of the program starts flashing again, etc.



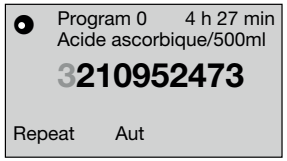
Press the (Set) key to leave the change mode.
The circle stops flashing and changes into a filled circle. At the upper right the total running time of the program is displayed. “Start” appears at the lower right.

6.3 Starting a New Shaking Program

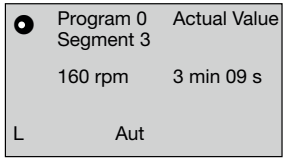
Before a shaking program is started, the respective program has to be selected in the automatic mode with the rotary switch.
In this example, program 0 was selected.



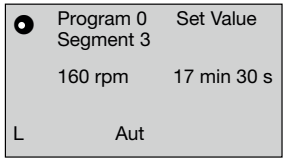
Program 0 was selected.
All segments, the program name and the total running time appear on the display.



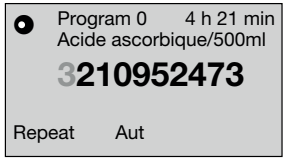
Press the (OK) key to start the program.
The circular turning ring appears and the time of the program is running down.
The respective active segment number is flashing.



With the page key (Page) the display can be changed to the respective actual values of the active segment.
Speed, remaining running time, and direction of rotation of the active segment are displayed.

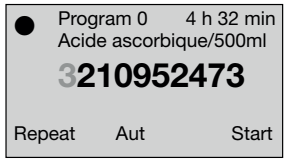


Press the page key (Page) again to change to the set values of the respective active segment.
Speed, total running time, and direction of rotation of the active segment are displayed.



Press the page key (Page) again to retun to the program display.

GB

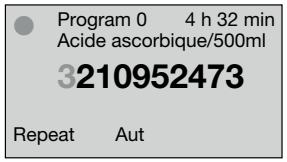


The program can be stopped at any time by pressing the Stop key.
After the stop the program display with all segments appears.
When a program is stopped while actual values or set values are displayed, the program display also appears.
To restart the shaking process, press the OK key.

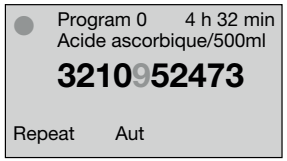
In the automatic operating mode the shaking process can be stopped with the stop key only.
Changes of the set values via the rotary switch are not possible during a running program.

6.4 Deletion of a Segment in a Program

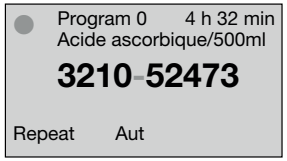
Deletion of a segment in a program is only possible when the shaker is stopped.



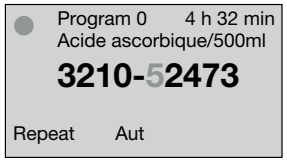
Activate the device and select the program menu as described above.
Example:
Segment no. 9 is to be deleted in program no. 0.
Press the set key Set to enter the change mode.
The circle flashes, as does the number of the first segment.



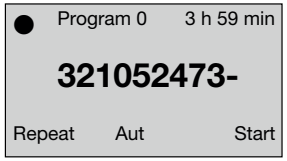
Confirm segments 3, 2 1, and 0 with the OK key.
Now segment no. 9 is flashing.



Turn the rotary switch OK until a bar is displayed instead of no. 9. Confirm with the OK key.



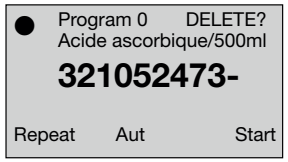
Segment no. 9 has been deleted.
Segment no. 5 is flashing



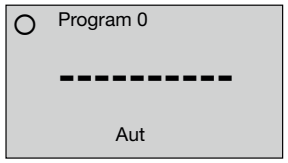
Press the Set key to leave the change mode.
Segment no. 9 has been deleted. The empty space (bar) is shifted to the end of the program.
The total running time of the program is reduced by the running time of segment no. 9.

GB

6.5 Deletion of a Complete Program



Press the Stop key for 2 sec. to delete a complete program. In the display the prompt for confirmation „DELETE?“ appears. Confirm with the OK key.
If you do not wish to delete the values, press the Stop key again. The program remains stored.
When the prompt for confirmation DELETE? appears and no key is pressed for 5 sec., the display changes automatically to the standard program display.
The “delete” process must be started anew.



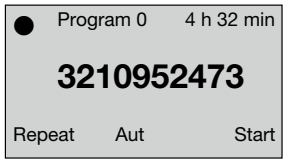
After the deletion process the program is displayed again without any segments.
The name of the program is also deleted and must be re-entered at the personal computer when the program has been redefined.
The single circular ring indicates that no segment has been defined for this program.

6.6 Delayed Start

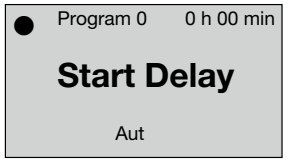
This function allows a time-delayed start of the shaker. It is useful, for example, if the progam has to be completed at a certain time and the start time would be during the night.

Note: This function is only possible in the automatic operating mode.

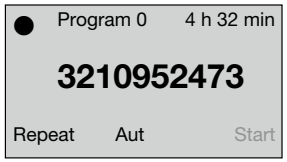
Example



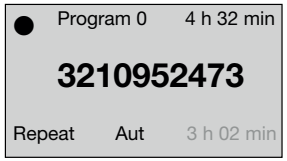
When the device is activated, the display for the automatic operating mode appears. The program could be restarted by pressing the OK key.
Instead, press the page key before the program start to go to the display for delayed start.



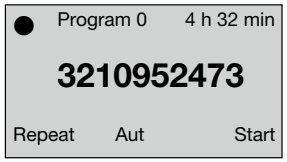
Turn the rotary switch OK to select the delay time (max. 99h 59min). Confirm by pressing the OK key.
With this confirmation you return to the program display.



„Start“ and the remaining time are flashing alternately until the start.
The program can also be started immediately by pressing the OK key.
The delay time is deleted and has to be re-entered before a new start.



During the last 10 seconds before the start an acoustic signal warns the user of the forthcoming start of the shaker.
The start delay can switched off at any time by pressing the Stop key.

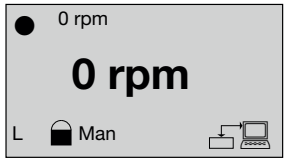


Press the page key again to change to the delayed start display if you wish to define a new time delay.

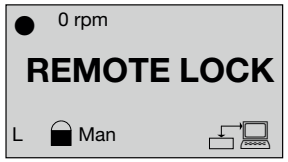
GB

6.7 Remote Operation

With the remote operation function the shaker can be completely controlled via the USB interface or the control interface.
In this operating mode all keys are locked except the Stop key.



Activate the remote operation function by pressing the keys and Set simultaneously. The lock symbol and the symbol for remote operation appear on the display.



While in remote operation, „REMOTE-LOCK“ will appear on the display if any key is pressed or if the rotary switch is turned.
Press the Set key to go back to manual operation.

Press the key combination and Set again to return also to manual or automatic operation.

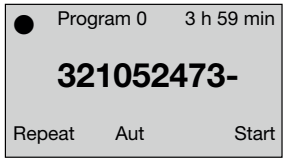
The remote operation function is only relevant in combination with the options USB interface or control interface.
A detailed interface protocol is delivered with the respective option.

6.8 Programming M1 Menue

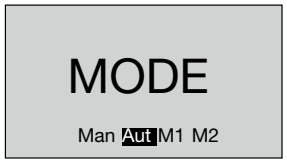
The M1 menu is not password protected and can be accessed by every user.
The following functions can be accessed and changed in this menu:

Sub-menu	Function	Display	Setting	Default
01	Multiple alarm	Alarm	On/Off	Off
02	Direction of rotation	Direction	Right/Left	Right
03	External temperature sensor	PT 1000 extern	On/Off	Off
04	Signal End of program	Signal P-Ende	On/Off	On
05	Signal tone for key activation	Signal Key	On/Off	On
06	Contrast regulation of display	Contrast	0 - 60	46

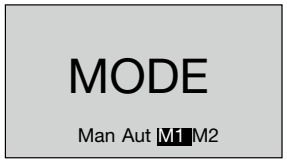
Example



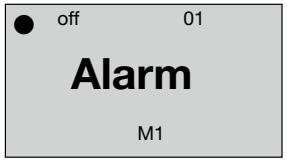
When the device is switched on, the operating mode which was active before it was switched off is activated again. In this example program 0 was active.



Press the OK key for 2 sec.
MODE appears on the display.
The operating mode „automatic“ appears inverted since it was last activated.
Turn the rotary switch OK to select a different mode. The selected mode always appears inverted.

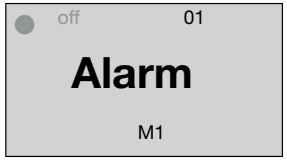


Select menu M1,
then press the OK key to access menu M1.

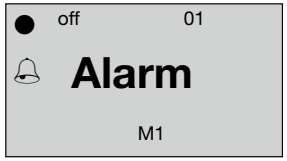


The submenu 01 alarm appears on the display.
In this submenu the multiple alarm can be activated or deactivated.
At the upper left the active setting is indicated.
At the upper right the number of the submenu is displayed.

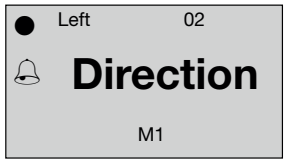
GB



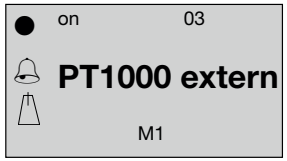
Press the set key Set to enter the change mode.
The circle at the upper left as well the active setting are flashing (here: “off”).
Turn the rotary switch OK to select a different setting (in this case „on“).
When the alarm is activated (“on”), the bell symbol appears on the display.
The alarm limits are defined in menu M2.



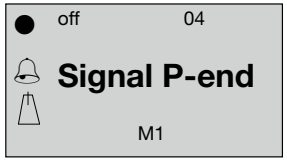
To activate the selected setting press the OK key. Press the Set key to leave the change mode again.
The circle at the upper left stops flashing. By turning the rotary switch, the next submenu can be selected.



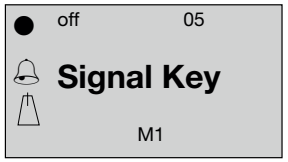
In submenu 02 the direction of rotation for manual operation can be selected. Proceed as described above for the alarm submenu.
The choices are „Left“ (anti-clockwise) or „Right“ (clockwise). The first letter of the direction (L or R) appears on the display at the lower left during operation.



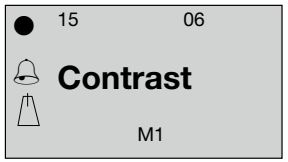
In submenu 03 you can choose whether or not the temperature of an external sensor is displayed.
Note: The temperature is always controlled via the integrated temperature sensor!
Possible settings are „on“ and „off“. When “on” is selected, a symbol representing an Erlenmeyer flask will appear on the display during operation.



In submenu 04 the acoustic signal for end of program or end of segment is activated.
Possible settings are „on“ and „off“.
This setting is not shown on the display.



In submenu 05 the acoustic tone for the keys is activated.
Possible settings are “on” and “off”.
This setting is not shown on the display.

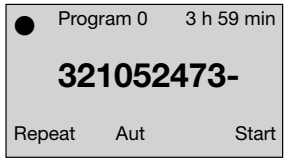


In submenu 06 the contrast of the display can be adjusted.
An adjustment can, for example, become necessary if the room temperature changes.
Possible settings are 0 – 100.
An adjustment of the contrast is immediately visible on the display. The figures only serve as a rough guide. The setting is not shown on the display during operation.

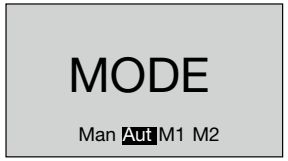
6.9 Programming M2 Menue

In the M2 menu the basic settings are defined.
This menu can be password protected.
The default password upon delivery is 0000.

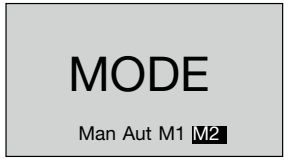
Example



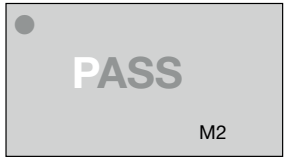
When the device is switched on, the operating mode which was active before it was switched off is activated again. In this example program 0 was active.



Press the OK key for 2 sec.
MODE appears on the display.
The operating mode „automatic“ appears inverted since it was last activated.
Turn the rotary switch OK to select a different mode.
The selected mode always appears inverted.

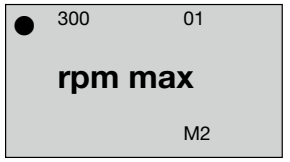


Select menu M2, then press the OK key to access the M2 menu.

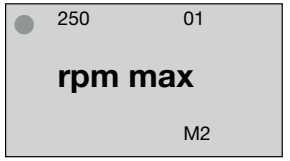


The circle at the upper left and PASS are flashing.
The first letter of the password is inverted. Turn the rotary switch OK to select a number between 0 and 9.
Press the OK key to confirm.
Now the next letter is inverted.
After all 4 numbers of the password have been entered and confirmed, the first submenu of M2 appears on the display. The factory setting of the password is 0000.

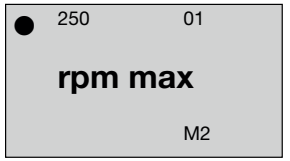
In case of loss of the password it is not possible for the user to access the M2 menu. In this case please contact the technical service of Edmund Bühler GmbH.



When the password has been entered, submenu 01: maximum speed appears on the display. In this submenu the maximum speed can be limited.
The factory setting depends on the type of shaker and is the maximum permissible speed. This value can be reduced only. In this example the maximum standard speed is set to 300 rpm.

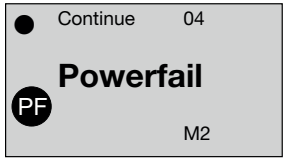


Press the Set key to access the change mode.
Turn the rotary switch OK to the left to reduce the maximum speed.
The reduction depends on the type of shaker and is possible down to the minimum speed of the respective model only.



Press the OK key to activate the chosen setting.
Leave the change mode by pressing the Set key again.
The circle at the upper left stops flashing.
Turn the rotary switch OK to go to the next submenu.

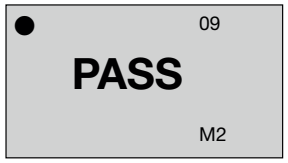
In submenu 04 the behaviour of the shaker after a power failure and power restoration can be defined.
You can choose between 3 possibilities:
Stop (default setting)
After a power failure the shaker will not restart. The user must start the shaker again manually.
Start
After a power failure the shaker restarts automatically at the beginning of the set program (automatic operating mode). In the manual operating mode, the set running time will start again at the beginning.
The user is warned before the start by an acoustic signal.
Continue
After a power failure the shaker starts again automatically and resumes the set program at the point of the power failure (automatic operating mode).



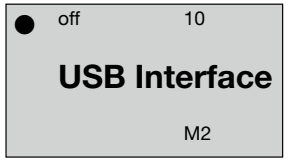
GB

In the manual operating mode the shaker will resume with the remaining running time. The operator is warned before the start by an acoustic signal.

When settings „Start“ or „Continue“ are active, the PF symbol is illuminated on the display to inform the user of the chosen setting.
After a power failure the PF symbol flashes until any key is activated.
It informs the user that a power failure occurred during the shaking process.



In submenu 09 the user can define a new password. This password will be valid from the next access to the M2 menu.
Press the Set key. Enter the new password as described above under access to the M2 menu.
Note: It is recommended to write the password down and keep it in a safe place.



In submenu 10 the USB interface can be activated. Press the Set key and make your selection with the rotary switch OK. The default setting is off (= not activated). This submenu only appears when the option „interface“ is integrated.

For detailed information on the USB interface please refer to the interface protocol. This protocol is included in the delivery of the option „interface“.
The numbering of the submenus is not consecutive. Several submenus are only necessary for the incubator shaker and therefore removed in the control of standard devices.

6.10 Submenus of M2 Menu (Configuration Menu) - Overview

Sub-menu	Function	Einstellung	Display	Default
01	Maximum speed	30-1400 rpm The max. value depends on the shaker type	Max rpm	Maximum shaker speed
04	Alarm output	00 only on display 01 on display and acoustic alarm 02 on display, acoustic alarm, via interface and via static signal	Alarm	00
05	Power failure	00 Device stops after power failure (and power restoration) 01 Device starts again after power failure and resumes the program at the point before the power failure 02 Device starts program anew after power failure	Powerfail	00
06	Alarm Speed deviation	00 – 50 rpm Values + or - Setting 0 = Parameter not controlled	Alarm rpm	00
11	Operating hour counter (Display: On Time) Time in hours that the shaker has been running („Shaking process started“)	No settings are possible		00

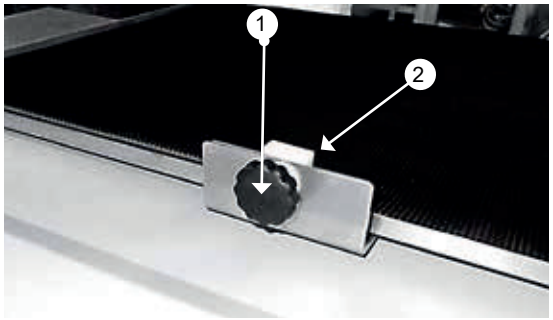
The submenus 02, 03, 07, 08, 09 und 10 are not relevant for shakers KS, TiMix, SM and VKS.

GB

7. Changing the motion

7.1 Universal Shaker SM 30 C control

The motion can be changed by actuating the lever at the front of the shaking plate:



- Loosen the star-shaped knob (1) at the front of the shaking plate and move lever (2) to the desired position.

Position	Motion
Lever at the right position	To-and-fro motion
Lever at the left position	Orbital motion

- After having chosen the motion, tighten the star-shaped knob again.

Change the motion only while the device is running at minimum speed! Changing the motion at high speed can damage the device.

7.2 Adjustment of the Counterweight (TiMix 5 control)

The shaker model TiMix 5 has an adjustable counterweight with which load changes of up to 5 kg can be compensated.

Before changing the counterweight, disconnect the device from the mains!

The finder sleeve (2) for an adjustment of the counterweight (7) is at the left side of the shaker (see drawing no. 0240 089).

- For changing the counterweight (7) the adjustment spindle (3) must be positioned exactly in the direction of the finder sleeve (2) (see. fig. 1). Switch the shaker off, turn the shaking plate (9) by hand into the furthest position at the right, then the adjustment spindle (3) and the counterweight (7) are at the left side in the direction of the finder sleeve (2). Control the position of the adjustment spindle (remove the cover (1), and look through the finder sleeve).

- Insert the tubular socket wrench (8) through the finder sleeve (2) and onto the positioning nut (4) by turning the socket wrench (8) slightly to the right or to the left so that it hooks on. Now separate the counterweight (7) from the positioning nut (4) by pressing the socket wrench (8) to the limit overcoming a slight spring pressure (see fig. 2). The travel of the spring is approx. 3 mm.

- The counterweight can now be adjusted according to the load by turning the socket wrench (8) to the left or to the right. For heavy loads (max. 5 kg) turn the socket wrench to the left. For light loads, turn it to the right.

- Before removing the socket wrench (8) make sure that the positioning pin (5) is fixed in one of the positioning drillings (6) of the positioning nut (4) by pulling the socket wrench back by approx. 3 mm (see fig. 3). In this position, the socket wrench should no longer be turnable.

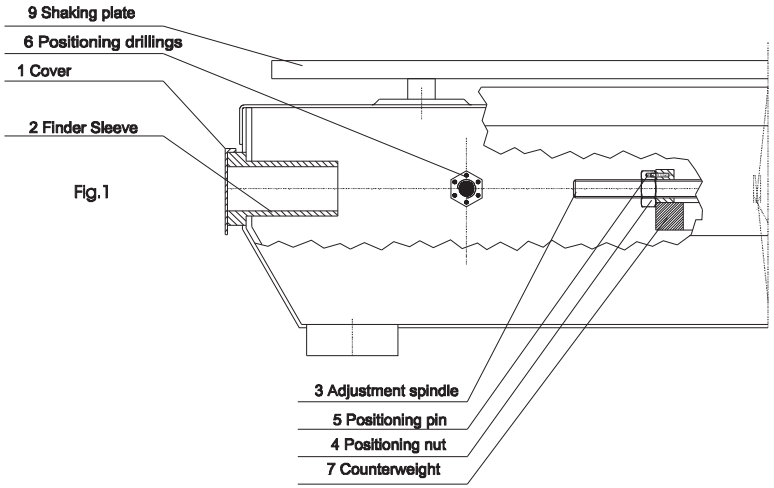


Fig.1

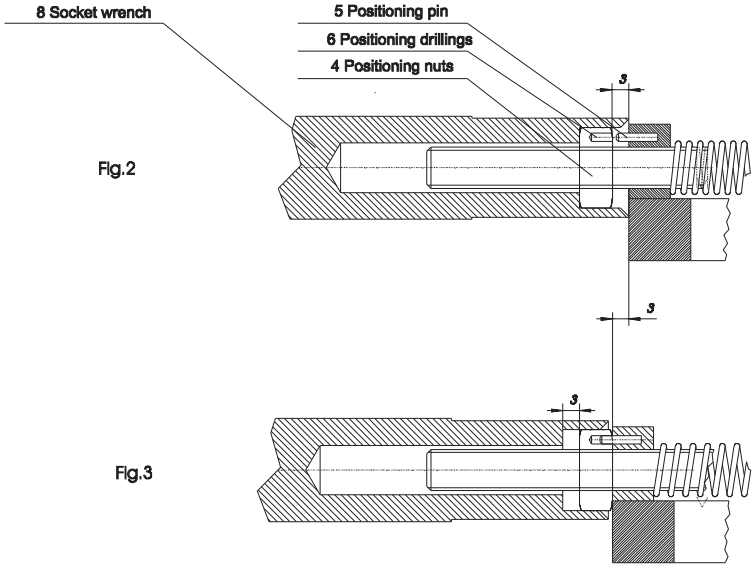


Fig.2

Fig.3

0240089

8. Exchange of Rack Systems of KS 15 control and TiMix 5 control

8.1 Compact Shaker KS 15 control

The KS 15 Control shakers can be delivered with alternative rack systems:
Rack system Combifix KS (No. 0052 071) with 3 clamping strips h or universal tray KS (No. 0051 471) for spring clamps (see Accessories / Rack Systems).

If you wish to change the rack system, proceed as follows:
For mounting the universal tray, the Combifix KS must be removed.
Remove the rubber mat and loosen the flat headed screws of the rack system.
Remove rack system. Fasten the universal tray KS with the flat headed screws and the distances which are delivered with the universal tray.

To mount the Combifix KS, proceed in reverse order.

8.2 Microplate Shaker TiMix 5 control

The TiMix 5 shakers can be combined with different rack systems for microplates or with the Combifix KS (No. 0052 071) or the universal tray KS (No. 0051 471) (see Accessories / Rack Systems).
These rack systems can be exchanged without problems.
Loosen the flat headed screws of the rack system or tray and fasten the required rack system instead.

9. Fastening of Multi-Storey Rack Systems

9.1 Microplate Shaker TiMix 5 control

The additional tray is delivered with mounted distance bolts. First remove the standard rack system from shaker (4 flat head screws M6). Then mount the additional tray with these screws onto the shaker. Then mount the standard rack system with the the delivered screws on the distance bolts of the additional tray.

9.2 Universal Shaker SM 30 A / B / C control

Mount the 2-storey top frame as described in the respective separate manual included in the delivery of the 2-storey top frame.

9.3 Multi Flask Shaker VKS 75 control

- Remove PVC plate from the shaking plate.
- Loosen the 6 flat headed screws M6 x 25 in the shaking plate and remove the shaking plate.
  (If required, i.e. for 1-storey operation, mount the shaking plate again.)
- Place the 3-storey top frame on the threaded bolts of the shaking frame and mount it with 6 Allen screws M6 x 25.

10. 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
Telefon: 07471 / 9864-0
Telefax: 07471 / 9864-75
e-mail: info@edmund-buehler.de

10.1 Exchange of the Fuse

The device is protected against overload by means of a fine fuse (see Technical Data).

The fuse holder is located at the back of the device below the mains plug.
The fuse can be exchanged after removal of the fuse insert.
The fuse insert contains 1 spare fuse.

Before removal of the fuse insert disconnect the mains plug!

10.2 Motor Protection

The capacitor drive is equipped with a thermal overload protection. In case of overload, caused e.g. by blocking or if the ambient temperature is too high, the drive is automatically switched off by the thermal protection which is directly inserted in the motor winding. When the winding has cooled down, the drive switches itself on again. The device must be switched off!

In case of defects, switch the device off and send it to the Technical Service Department of the Edmund Bühler GmbH, together with a detailed description of the defect (address: see above).

11. Maximum Shaking Speed

The below specified shaking speeds against load are approximate values. Depending on the specific properties of the substances to be shaken these values can differ marginally.

= Range not permitted.
Attention: Danger of serious damage!

11.1 Universal Shaker SM 30

Maximum load [kg] against shaking speed [rpm]

with **rack system Combifix SM or universal tray SM (1-storey operation)**

Type	Stroke (mm)	15 -180 rpm	200 rpm	220 rpm	240 rpm	260 rpm	280 rpm	300 rpm
SM A	26 mm*	30 kg	30 kg	30 kg	15 kg	10 kg	5 kg	5 kg
SM B	30 mm*	30 kg	30 kg	30 kg	20 kg	15 kg	10 kg	5 kg
SM B	46 mm	30 kg	20 kg	10 kg	10 kg	5 kg		
SM B	50 mm	20 kg	15 kg	10 kg	5 kg			
SM C ↻	26 mm*	30 kg	20 kg	15 kg	10 kg	5 kg		
SM C ↔	26 mm*	30 kg	25 kg	20 kg	15 kg	10 kg	5 kg	5 kg
SM AT	26 mm*	25 kg	25 kg	25 kg	15 kg	10 kg	5 kg	

with **2-storey top frame SM**

SM A	26 mm*	25 kg	20 kg	15 kg	8 kg	2 kg		
SM B	30 mm*	30 kg	30 kg	25 kg	20 kg	10 kg	8 kg	5 kg
SM B	46 mm	20 kg	10 kg	5 kg	2 kg			
SM B	50 mm	15 kg	5 kg					
SM C ↻	26 mm*	20 kg	20 kg	10 kg	5 kg			
SM C ↔	26 mm*	20 kg	20 kg	15 kg	10 kg	8 kg	5 kg	

* Standard configuration
We recommend to fasten the shaker on the floor or on the table with 4 PVC rings (part no. 0002754) when working with maximum permissible loads.

11.2 Multi Flask Shaker VKS 75

Maximum load [kg] against shaking speed [rpm]

with **rack system Combifix VKS or universal tray VKS (1-storey operation)**

Type	Stroke (mm)	30 - 50 rpm	50 -120 rpm	140 rpm	160 rpm	180 rpm	200 rpm
VKS 75 A	26 mm*	75 kg	75 kg	75 kg	75 kg	75 kg	75 kg
VKS 75 B	36 mm	75 kg	75 kg	75 kg	75 kg	60 kg	60 kg
VKS 75 B	50 mm*	75 kg	75 kg	75 kg	60 kg	50 kg	40 kg
VKS 75 B	60 mm	75 kg	75 kg	75 kg	50 kg	25 kg	
VKS 75 B	80 mm	75 kg	75 kg	60 kg	30 kg	10 kg	

with **2-storey rack system VKS or 3-storey rack system VKS „Giant“**

VKS 75 A	26 mm*	75 kg	50 kg	40 kg	30 kg	10 kg
VKS 75 B	36 mm	75 kg	50 kg	40 kg	30 kg	10 kg
VKS 75 B	50 mm*	75 kg	50 kg	30 kg	20 kg	
VKS 75 B	60 mm	75 kg	50 kg	30 kg	10 kg	
VKS 75 B	80 mm	75 kg	50 kg	20 kg		

* Standard configuration
We recommend to fasten the shaker on the floor or on the table with 4 PVC rings (part no. 0002754) when working with maximum permissible loads.

12. CE Declaration of Conformity

We,

Edmund Bühler GmbH

Schindäckerstraße 8
72411 Bodelshausen

Manufacturers of this product, declare under our sole responsibility that this product corresponds to the EC directives 2006/42/EG (machinery directive) and 2004/108/EG (EMC directive).

The following harmonised standards apply:

EN 61 010; EN 50 082; EN 55 014;EN 60 204; EN 60 555; EN292 and EN414.

For the shaker models SM 30 the following standards apply:

EN 61 326-1:2006-05

EN 61 000-3-2:2006-04

EN 61 000-3-3:1995-01+A1:2001-06+A2:2005-11

EN 61 326-1:2006-05

Responsible for the documentation:
Dipl.-Ing. (FH) Michael Schlecht
Schindäckerstraße 8
72411 Bodelshausen

Edmund Bühler GmbH
The Technical Director

GB

13. 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 foreseeen by the contract.
(See General Terms and Conditions of the Edmund Bühler GmbH).

The warranty period ends 24 months after delivery (date of invoice) or, for the multi-flask shaker VKS 75, after max. 8.000 hoiurs of operation (whichever comes first).

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.

14. Technical Data

	KS 15 control	SM 30 control	TiMix 5 control	VKS 75 control
Order No.	6170 000 (A) 6172 000 (B)	6100 000 (A) 6102 000 (B) 6104 000 (C)	6167 000	6111 000 (A) 6112 000 (B)
Speed range	30-420 rpm	15 - 300 rpm	100 - 1400 rpm	30 - 200 rpm
Shaking amplitude (Stroke)	17 mm	Standard Mod. A: 26 mm Mod. B: 30 mm Mod. C: 26 mm Options: Mod. B: 46 or 50 mm	3 mm	Standard Mod. A: 26 mm Mod. B: 50 mm Options: Mod. B 36, 60 or 80 mm
Loading capacity	max. 15 kg	max. 30 kg	max. 5 kg	max. 75 kg
Shaking plate (WxD) mm	400 x 300	560 x 400	400 x 300	760 x 600
Timer	programmable / 5s - 100h / ∞	rogrammable / 5s - 100h / ∞	rogrammable / 5s - 100h / ∞	rogrammable / 5s - 100h / ∞
Electrical supply	230 V, 50/60 Hz	230 V, 50/60 Hz	230 V, 50/60 Hz	230 V, 50/60 Hz
Fuse	125 W/0,63 AT	140 W/1 AM	140 W/1 AM	400 W/2,0 AM
Dimensions (WxDxH) mm	510 x 490 x 150	680 x 610 x 160	510 x 490 x 150	1050 x 835 x 250
Weight	18 kg	33 kg	20 kg	110 kg
Type of protection	IP 21	IP 21	IP 21	IP 21
Heat emission (appr.)	18 W	20 – 30 W	18 W	18 W
Ambient temperature	5°C to 50°C	5°C to 50°C	5°C to 50°C	5°C to 50°C
Max. rel. humidity	85 %	85 %	85 %	85 %

15. Basic Equipment

Compact Shaker KS 15 control	Basic device without shaking plate, without rack system
Microplate Shaker TiMix 5 control	Basic device without rack system; with socket wrench for adjustment of the counterweight
Universal Shaker SM 30 control	Basic device incl. shaking plate and rubber mat
Multi Flask Shaker VKS 75 control	Basic device without shaking plate; with 4 fastening rings + 8 screws for floor attachment

16. Rack Systems and Loading Capacities

16.1 Rack Systems for KS

Rack system Combifix KS

Consisting of basic rack with rubber mat and 3 clamping strips h for KS

Order No. 0052 071

Universal tray KS

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 and a high loading capacity.

The coated tray is proof against aggressive liquids.

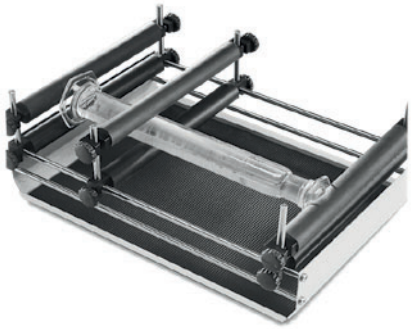
Universal tray KS, without spring clamps

Order No. 0051 471

16.2 Additional Strips for Combifix KS

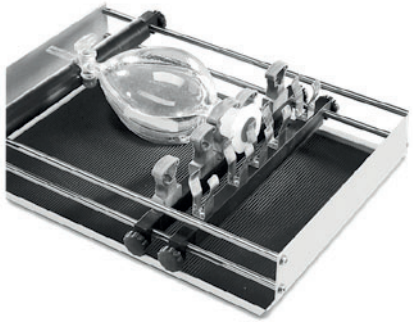
All flat-bottom vessels (Erlenmeyer flasks, beakers, test tube racks, sieves, etc.) can easily be fixed on the shaker with the clamping strips h. In addition to the clamping strips h supplied with the Combifix KS.

Clamping strip h for KS
Order No. 0050 118



The clamping strips v are used in combination with the clamping strips h in order to fasten horizontal vessels, e.g. measuring cylinders, between the strips, or as added support for high vessels (flasks, beakers, cylinders).
The maximum distance between the strips is 60 mm. In addition to the clamping strips h.

Clamping strip v for KS
Order No. 0050 477



The cramp strips and spring strips are necessary for fastening separating funnels. The necks of the separating funnels are fastened in the grey plastic clamps, the spring strip secures the stoppers. The stems of the separating funnels are placed on a clamping strip h. For a modification
of the standard rack system or in addition to the clamping strips h.

Cramp strip for KS
Order No. 0050 206

Spring strip for KS
Order No. 0050 207

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

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

16.3 Loading Capacity of Rack System Combifix KS

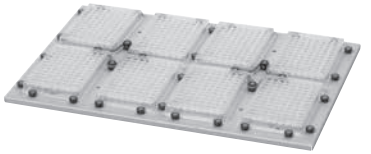
	Size	Qty (pcs)
Erlenmeyer flasks	50 ml	25
	100 ml	20
	250 ml	12
	500 ml	6
	1000 ml	4
	2000 ml	2
	3000 ml	1
	5000 ml	1
Separating funnels	100 ml	4 [1)]
	250 ml	1 [1)]
	500 ml	1 [1)]
	1000 ml	1 [1)]
	2000 ml	1 [1)]
Test tube racks		2

[1)]with 1 cramp strip (0050 206) and 1 spring strip (0050 207) additional

16.4 Loading Capacity of Universal Tray KS

	Size	Qty (pcs)
Spring clamps	10 ml	68
	25 ml	34
	50 ml	27
	100 ml	24
	250 ml	15
	500 ml	9
	1000 ml	5
	2000 ml	2
	3000 ml	1
	5000 ml	1
Test tube racks (with hinged foot)		3

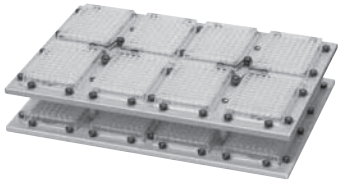
16.5 Rack Systems for TiMix 5



Standard rack system

For 8 standard microplates, microwell
or deepwell plates, or other plates of the same size.

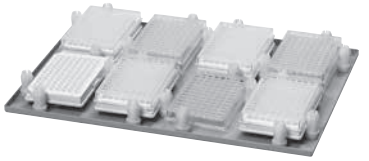
Order No. 0052 101



Additional tray

As a second storey on the standard rack system TiMix 5. Distance between the 2 trays max. 55 mm.

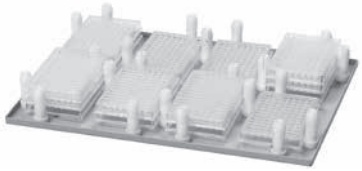
Order No. 0052 102



Rack system with clamping pins

For 8 standard microplates (128 x 85 mm)

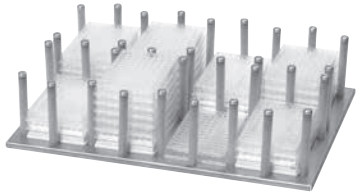
Order No. 0052 096



Rack system with high clamping pins

For max. 24 standard microplates, placed directly on top of each other

Order No. 0052 104



Rack system with metal clamping pins

For max. 48 standard microplates, placed directly on top of each other

Order No. 0052 104

Rack systems Comibfix KS and Universal tray KS

Picture, description and order no.
see chapter 16.1

GB

16.6 Rack Systems for SM

Combifix SM, Assembly A

consisting of basic rack and 5 clamping strips h.

Variable rack system for fastening different vessels with flat bottom (Erlenmeyer flasks, beakers, test tube racks, sieves etc.).

Order No. 0050 154

For further extension or for modifying Combifix B or C systems, the clamping strips h are available as separate items:

Clamping strip h for SM

Order No. 0050 400

Combifix SM, Assembly B

consisting of basic rack and 4 clamping strips h + 4 clamping strips v.

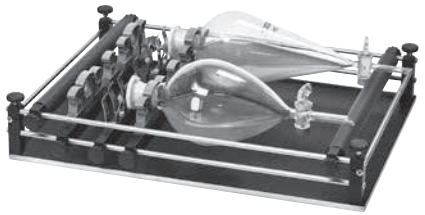
Rack system for secure fastening of horizontal vessels, e.g. measuring cylinders, between the clamping strips, or as added support for high vessels (flasks, beakers, cylinders). The maximum distance between the strips is 60 mm.

Order No. 0050 155

For further extension or for modifying Combifix A or C systems, the clamping strips v are available as separate items:

Clamping strip v for SM

Order No. 0050 399



Combifix SM, Assembly C

consisting of basic rack and 2 clamping strips h, 2 cramp strips and 1 spring strip

Special rack system for separating funnels. The necks of the separating funnels are fastened in the grey plastic clamps, the spring strip secures the stoppers. The stems of the separating funnels are placed on a clamping strip h.

Order No. 0050 156

For further extension or for modifying Combifix A or B systems, the strips are also available as separate items:

Cramp strip for SM

Order No. 0050 401

Spring strip for SM

Order No. 0050 402

Universal tray SM

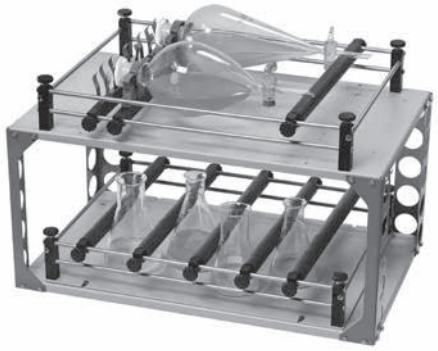
Coated aluminium tray. The drillings of the universal tray (28.3 mm apart) allow flexible loading with spring clamps or test tube racks.

The tray is proof against aggressive liquids.

Universal tray SM, without spring clamps

Order No. 0051 472

GB



2-storey top frame SM

Top frame with two trays for spring clamps - or for Combifix SM systems.

For easy handling, sliding plates with Combifix SM or universal trays SM can be mounted. These allow loading of the racks away from the shaker.

2-storey top frame SM (without spring clamps or rack systems Combifix SM)

Order No. 0052 065

2-storey top frame SM/TH

Smaller top frame which can be used inside the incubator hood TH 30.

For small or flat sample vessels with a max. height of approx. 14 cm.

The top frame SM/TH can only be used in combination with universal trays SM or sliding plates SM.

2-storey top frame SM/TH (without spring clamps or rack systems Combifix SM)

Order No. 0052 117

Sliding plates SM

Combifix SM systems for multi-storey frames mounted on plates.

Description of the Combifix systems: see page 51, 52

Sliding Plate with Combifix SM,
Assembly A
Order No. 0051 484
Assembly B
Order No. 0051 485
Assembly C
Order No. 0051 486

Spring clamps / Test tube racks

See chapter 16.2

16.7 Loading Capacity of Rack Systems Combifix SM

	Size	Qty (pcs)
Erlenmeyer flasks	50 ml	49
	100 ml	42
	250 ml	20
	500 ml	12
	1000 ml	6
	2000 ml	6
	3000 ml	4
	5000 ml	2
Separating funnels	100 ml	10
	250 ml	6
	500 ml	4
	1000 ml	4
	2000 ml	1 - 2 [2)]
Test tube racks		4

[2)] Number of pieces depends on shape and dimensions of the separating funnels

16.8 Loading Capacity of Universal Tray SM

	Size	Qty (pcs)
Spring clamps	10 ml	117
	25 ml	64
	50 ml	63
	100 ml	49
	250 ml	23
	500 ml	15
	1000 ml	11
	2000 ml	6
	3000 ml	4
	5000 ml	2
Test tube racks (with hinged foot)		5

16.9 Rack Systems for VKS

Shaking plate VKS

Base plate to be fastened on the shaker, incl. supporting plate.

On this base plate, the universal tray VKS or one of the Combifix VKS systems can be mounted.

Order No. 0052 070

Combifix VKS, Assembly A

consisting of basic rack and 9 clamping strips h.

Variable rack system for fastening different vessels with flat bottom (Erlenmeyer flasks, beakers, test tube racks, sieves, etc.)

Order No. 0051 487

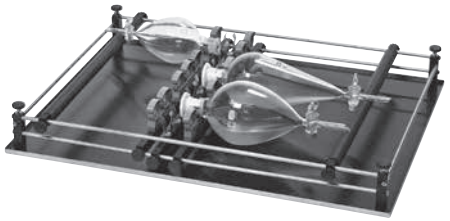
For further extension or for modifying Combifix B or C systems, the clamping strips are available as separate items:
Clamping strip h for VKS
Order No. 0050 387

Combifix VKS, Assembly B

consisting of basic rack and 4 clamping strips h + 4 clamping strips v.

Rack system for secure fastening of horizontal vessels, e.g. measuring cylinders, between the clamping strips, or as added support for high vessels (flasks, beakers, cylinders). The maximum distance between the strips is 60 mm.
Order No. 0051 488

For further extension or for modifying Combifix A or C systems, the clamping strips are also available as separate items:
Clamping strip v for VKS
Order No. 0050 388



Combifix VKS, Assembly C

consisting of basic rack and 2 clamping strips h, 2 cramp strips and 1 spring strip.

Special rack system for separating funnels. The necks of the separating funnels are fastened in the grey plastic clamps, the spring strip secures the stoppers. The stems of the separating funnels are placed on a clamping strip h.

Order No. 0051 489

For further extension or for modifying Combifix A or B systems, the strips are also available as separate items:

Cramp strip for VKS
Order No. 0050 390

Spring strip for VKS
Order No. 0050 389

Universal Tray VKS (1-storey)

Coated aluminium tray. The drillings of the universal tray (28.3 mm apart) allow flexible loading with spring clamps or test tube racks.

The tray is proof against aggressive liquids.

Universal Tray VKS, without spring clamps

Order No. 0051 474

3-storey top frame VKS „Giant“

Practical frame for 3 „VKS“ trays or 6 „SM“ trays. Universal trays or sliding plates with Combifix can be used.

The frame is mounted directly on the basic device.

3-storey top frame „Giant“,
without trays
Order No. 0052 068

Universal tray VKS
for 3-storey top frame „Giant“ without spring clamps
Order No. 0051 496

Sliding Plates VKS

Combifix VKS systems for 3-storey top frame „Giant mounted on plates. Description of the Combifix systems: see page 55, 56.

Sliding Plate with Combifix VKS,
Assembly A
Order No. 0051 493
Assembly B
Order No. 0051 494
Assembly C
Order No. 0051 495

Spring clamps / Test tube racks
see Chapter 16.2

Alternative platforms

Sliding plates SM

Combifix SM systems for multi-storey frames mounted on plates. Description of the Combifix SM systems
see 16.6

Sliding Plate with Combifix SM,
Assembly A
Order No. 0051 484
Assembly B
Order No. 0051 485
Assembly C
Order No. 0051 486

16.10 Loading Capacity of Rack Systems Combifix VKS

	Size	Qty (pcs)
Erlenmeyer flasks	50 ml	104
	100 ml	82
	250 ml	45
	500 ml	32
	1000 ml	20
	2000 ml	12
	3000 ml	9
	5000 ml	6
Separating funnels	100 ml	14
	250 ml	10
	500 ml	6 - 8 [3]
	1000 ml	6
	2000 ml	2 - 4 [3]
Test tube racks		8

[3] Number of pieces depends on shape and dimensions of the separating funnels

16.11 Loading Capacity of Universal Tray VKS

	Size	Qty (pcs)
Spring clamps	10 ml	280
	25 ml	138
	50 ml	136
	100 ml	62
	250 ml	52
	500 ml	35
	1000 ml	21
	2000 ml	12
	3000 ml	9
	5000 ml	6
Test tube racks (with hinged foot)		8

Edmund Bühler GmbH
Since 1880

www.edmund-buehler.de

MADE IN GERMANY

Edmund Bühler GmbH
Schindäckerstraße 8
72411 Bodelshausen / Germany
Tel.: +49 7471 9864-0
Fax: +49 7471 9864-75
info@edmund-buehler.de