

# OPERATING INSTRUCTIONS

for vertical sterilizer

**KSG 30/50-1**

KSG 40/60-1

KSG 50/70-1

KSG 50/80-1

**- single-walled execution -**

**without**

sterilization timer and contact thermometer

only for for sterilization of **unwrapped** and **not porous** hospital utensils  
as instruments, glas and plastic goods

Modifications reserved. 09.09.05

51XEXMXX.XXX

**S-No.** XXXX

Electric diagram 01E030501E001

Piping diagram 1415-3

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# 1. Description

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**Order No.:** XXXXXX

**Serial No.:** XXXX

**Year of construction:** 2007

Operator

**Full mark of steam sterilizer:**

**KSG 30/50-1** Aukl 002 040  
single-walled  
electrically heated

KSG 40/60-1 Aukl 002 066  
single-walled  
electrically heated

KSG 50/70-1 Aukl 002 068  
single-walled  
electrically heated

KSG 50/80-1 Aukl 002 078  
single-walled  
electrically heated

## 1.1. Intended use of the unit

This execution of sterilizer can only be used for sterilization of **unwrapped, non-porous** solid goods like instruments, glass, rubber and plastic at a sterilization temperature of **134 °C** or **121 °C**.

As the sterilizer works according to the principle of gravitation **no porous goods** (i.e. textiles), **no hollow bodies** (i.e. tubes, pipes) and **no wrapped goods** (i.e. in shrink or paper foil, in fabrics or cassettes) can be sterilized. Hollow receptacles may preferably be sterilized opening downward.

**Solutions, independent from the size of the receptacles, may not be sterilized in this sterilizer.**

**In no case inflammable materials may be sterilized.**

**No living beings may be sterilized.**

The device is not been suitable for the sterilisation (destruction) by the lab goods which were submitted to a **chemical and / or biological** treatment. Such treated goods may **not** be sterilized.

## 1.2. Intended aim

The aim of sterilization is the achievement of the sterility of a sterilizer load (charge) acc. to the sterilizing process.

**Hint:** Sterile is the condition of a (medical) product, which is free from active micro organisms (EN 556).

## 2. Installation

- 2.1 **Read the operation instructions *before* setting the apparatus into operation.**
- 2.2 Take care that the power supply is in accordance with regulations, see name plate.
- 2.3 Take care that the electric power supply satisfies the valid regulations on site.
- 2.4 **Attention:** main switch to be installed on site
- 2.5 Prepare cold water connection for cooling.
- 2.6 Take care that there is a water discharge (e.g. gully) under the sterilizer for the discharge pipes of the sterilizer.
- 2.7 To guarantee the stability of the sterilizer, the apparatus feet (27) have to be fixed to the ground.
- 2.8 If the sterilizer is not used, please close the inlet valve "cooling water" (24)

### 3. Technical Data

Type	Chamber Diameter	Chamber Height	Chamber Volume	Current	Capacity	Operating water until NW	Operating water NW until HW
30/50-1	30 cm	50 cm	035 dm <sup>3</sup>	10,0 A	06,5 kW	11,5 Litre	07,5 Litre
40/60-1	40 cm	60 cm	075 dm <sup>3</sup>	14,5 A	09,5 kW	21,4 Litre	11,6 Litre
50/70-1	50 cm	70 cm	137 dm <sup>3</sup>	19,0 A	12,5 kW	32,0 Litre	28,0 Litre
50/80-1	50 cm	80 cm	157 dm <sup>3</sup>	19,0 A	12,5 kW	31,0 Litre	09,0 Litre

Operating pressure  $p_e$  : 2,5 bar

Operating temperature: 134 °C

Nominal voltage: 230/400 V

Current: Alternating current

Nominal frequency: 50/60 Hz

NW = Low water  
 HW = High water

## 4. General Remarks

- 4.1 **Feeding water:** for operation of the sterilizer either distilled or demineralized water is necessary.
- 4.2 Indications concerning the filling quantity of operating water in case of empty chamber up to minimum water level (NW) and from minimum water level(NW) up to max. water level (HW) can be taken from paragraph **2. Technical Data**.
- 4.3 The switchbox (9) with its operating and indicating elements makes it possible to operate the sterilizer acc. to the operating instructions and the control of the programme.
- 4.4 2 radiators (20).
- 4.5 Water shortage protection switch (17) resettable.
- 4.6 Regulator and adjustor for sterilization pressure (18), max. 2,5 bar.



## 5. Operating Instructions

For setting the sterilizer into operation, please proceed as follows:

### 5.1. Control of feeding water

Level of feeding water (distilled water or demineralized water) has to be between the markings for minimum and maximum water level. Should this not be the case, the chamber (1) has to be filled with a corresponding quantity of water until the maximum mark of water level indication (4). This is done by filling in water through the opened lid (2) when the chamber is empty and depressurized. Care has to be taken that the max. marking is not exceeded.

- 5.1.1. Control emptying valve (26), if necessary, close it. Fill in distilled or demineralized water into the open chamber (1) until water level (4) has reached the max. marking.
- 5.1.2. Loading of the sterilizer
- 5.1.3. Please clarify the sterilizing goods acc. to sterilizing temperature and time (table 7).
- 5.1.4. If necessary / scheduled, put the solid sterilizing goods into the corresponding baskets (accessories). **Do not use packages or boxes.**
- 5.1.5. Place the sterilizing goods into the sterilizing chamber and put them on the ground plate resp. on the trays (accessories). The chamber can be filled up until its upper edge.

## **5.2. Closing of the lid**

- 5.2.1. After the loading of the chamber, please close the lid (2).
- 5.2.2. To that end turn the lid by the operating handles (2a), counter-clockwise until the limit stop and fix it in this position.
- 5.2.3. Then tilt the lid downwards until it lies on the gasket (3).
- 5.2.4. Afterwards please turn the lid by means of the operating handle (2a) in counter wise until the limit stop (view from top).
- 5.2.5. At last close the function safety valve (7). You have to press the operating lever (8) of the function safety valve (7) from its horizontal position to the top in to the slit of the operation handle (2a).
- 5.2.6. Heating of sterilizer - Heating-up time
- 5.2.7. The saturated steam necessary for sterilization is produced in the chamber with the help of two electric heating elements (20). To start the heating process, please proceed as follows:
- 5.2.8. Execute control acc. to point 5.1
- 5.2.9. Close emptying valve (21).
- 5.2.10. Adjust/control the sterilizing pressure at the adjusting device for sterilizing pressure (18) to the required value acc. to table 7.
- 5.2.11. Actuate the green ON/OFF switch (10) to "ON" position (control lamp lights up green). During the started heating process the adjusted sterilizing temperature is reached after approx. 30 - 45 min., if the boiler is filled up to max. During the heating-up time the heating is in operation. This can be seen by the yellow control lamp "Heating" (12).
- 5.2.12. Open the inlet valve for cooling water (24) accordingly for cooling of condensate.

### 5.3. Sterilization

Control/adjust the sterilizing pressure to the required value at the adjusting device for sterilizing pressure (18) acc. to table 7.

The preheating process (heating-up time) is finished when the required and adjusted sterilizing pressure is reached in the chamber.

**Note:** The air in the sterilizing chamber is displaced by the developing steam and led off via the automatic ventilator (22). At a temperature of 100° C and higher this constructional part is closed and makes it possible that the steam pressure is produced in the sterilizing chamber.

As soon as the sterilization thermometer (15) has reached the required sterilizing temperature, the sterilization phase starts. It has to be controlled by a chronometer. Care has to be taken that the sterilizing temperature is maintained during the sterilization phase resp. that in case of undergoing the sterilizing temperature the time is interrupted until the temperature is reached again.

**Attention:** The sterilizer lid (2) is hot during operation !!!

#### 5.4. End of programme - reduction of chamber pressure

After the end of the sterilization time (measured sterilizing time corresponds to full sterilizing time) the on/off switch (10) has to be switched off, so the electrical radiators (20) are switched off too. The sterilized goods can be removed **after pressure reduction** in the sterilizing chamber. This pressure reduction can be effected in different ways, acc. to requirement resp. demand (see table 7):

**By self-cooling** of the whole sterilizer. This is done automatically after having switched off the sterilizer at the green on/off switch. The lid (2) can be opened, when the pressure in the sterilizing chamber (1) has sunk to "0" bar (to be seen at the pressure gauge (25) for the sterilizing chamber (1)).

**By rapid reduction** of pressure from the sterilizing chamber (1) by opening the emptying valve (21) carefully after having switched off the sterilizer at the green on/off switch. To cool down the escaping steam before it enters the drain system, please open the inlet valve for cooling water (24) for the cooler (30) until a mixed temperature of max. 70 °C is reached at the entrance into the drain system. This procedure must be maintained until the pressure of the sterilizing chamber is "0" bar (to be seen at the pressure gauge (25) for the sterilizing chamber (1)).

**Attention:** Steam escape at the exit !

## 5.5. Opening the lid

After the pressure reduction (the pressure gauge (25) for the sterilizing chamber (1) shows "0" bar ) the lid (2) can be opened.

- 5.5.1. In order to open the lid (2) open the function safety valve(7) with the operation lever (8) (bring lever to horizontal position ). Remaining overpressure in the chamber (1) will escape through the **exhaust steam pipe** of the function safety valve (7).

**Attention:** Eventually there will be steam exhaustion through the **exhaust steam pipe** of the function safety valve (7)

- 5.5.2. By using the handles (2a) for the lid (2) clockwise (viewing the lid (2) from above) until the limit stop and thereafter tilt it upside.

**Attention:** Eventually there will come some vents of hot steam out of the sterilizing chamber (1)

- 5.5.3. Now the probably hot sterilized goods can be taken out of the chamber.

## **5.6. Preparation for further sterilizations**

When a sterilization has been finished acc. to point 5.4, the sterilizer can quickly be prepared for the next charge, as it is still heated up from the first cycle.

- 5.6.1. Close the following valves (if open):
  - Emptying valve for sterilizing chamber (21)
  - Inlet valve for cooling water (24)
  
- 5.6.2. Control the water level of the chamber at the water level indication (4), if necessary fill in distilled or demineralized water acc. to point 5.1.
  
- 5.6.3. Adjust resp. control the required pressure adjustment at the pressure regulator (18) acc. to table 7.
  
- 5.6.4. Load the chamber with the goods to be sterilized.
  
- 5.6.5. Close the sterilizer lid (2) as described under 5.2.
  
- 5.6.6. Switch on the sterilizer at the green on/off switch (10).

## **5.7. Switching off the sterilizer**

For final switching off of sterilizer, e.g. after the last cycle of a day, switch off ON/OFF-switch (10) - green lamp goes out. It is recommendable to switch off the main switch and to close the valve for cooling water (24) as well as the main cock for cooling water on site.

## 6. Safety Devices

### 6.1. Water shortage in the chamber

Above the radiators (20) a sensor (17a) is built into a micro heating element, so that they cannot burn through in case of extreme shortage of distilled or demineralized water. In case of water shortage the temperature sensor - heated up by the micro heating element - gives a signal to the water shortage protected switch (17). Via a contactor (16) this switch separates durably the radiators (20) and the small radiator in the water shortage sensor (17a) from electric current. At the same time the red control lamp "water shortage" (13) lights up.

For removing the water shortage open carefully the emptying valve (21) for rapid steam pressure reduction. Before open the inlet valve for cooling water (24) correspondingly - see 5.4.

After pressure reduction in the chamber has been effected (pressure gauge (25) for the sterilizing chamber must be "0" bar), the sterilizer lid (2) can be opened as described under 5.5 and the water level can be increased acc. to point 5.1. Afterwards the sterilizer lid (2) has to be closed - see 5.2.

After having closed the lid (2) and the temperature in the boiler water - and thus at the water shortage sensor (17a) has dropped down, the "reset"-button of the water shortage protected switch (17) has to be pressed. Now the red lamp "water shortage" (13) goes out. The sterilizing programme is started again.

The sterile goods have in any case to be considered as not sterile and to be sterilized again.

## 6.2. Function safety valve

When the sterilizer lid is orderly closed, the function safety valve (7) prevents by its operation lever (8) that the lid can be opened when the sterilizing chamber is under pressure. If anyone tries to open the chamber nevertheless, the lever (8) has to be operated first. This would mean that via the activated function safety valve (7) possibly existing pressure would be reduced and be led away via the exhaust pipe.

## 6.3. Sterilizer lid

The sterilizer lid (2) is locked with the sterilizer by a groove and tongue profile, so that an opening of the lid is impossible when there is an inner pressure. Should the lid be opened - due to an accumulation of malfunctions (defective function safety valve or wrong operation) - when there is still a remaining pressure inside the chamber, this inner pressure presses the lid into the mechanical locking position, before it can be opened completely. Due to the arrangement of the groove and tongue profile the remaining pressure can escape between chamber (1) and lid (2), but a dangerous flying open of the lid is surely prevented.

## 6.4. Safety valve

If an inadmissible high steam pressure > 2,5 bar resp. an inadmissibly high chamber temperature > 138 °C is produced - due to a simultaneous defect of the pressure regulator (18) - the safety valve (19) reacts. Due to the high inner pressure of the chamber the locking mechanism of the safety valve (19) is opened. The steam can be reduced via the exhaust tube, so that an inadmissibly high inner pressure in the chamber can be prevented.

In case of reaction of the safety valve (19), switch off the apparatus by the ON/OFF switch (10) and control especially the adjustment of pressure regulator (18).



## 7. Table

Programme	Goods to be sterilized	Sterilizing pressure	Sterilizing temperature	Sterilizing time	Method of cooling
A	Rubber goods	1,2 bar	121 °C	30 Min.	Quick steam reduction or self-cooling
B	Utensils Instruments	2,4 bar	134 °C	10 Min.	Quick steam reduction or self-cooling

### Sterilizing goods

In the program "A" (1,2 bar / 121 °C) only solids may be sterilized in not packed form, not porous and are not in the form of tube with a sterilizing temperature of 121 °C - 125 °C.

In programme "B" (2,4 bar / 134 °C) only solids may be sterilized in not packed form, not porous and are not in the form of tube with a sterilizing temperature of 134 °C - 137 °C.

## 8. Maintenance of Sterilizer

In case of external contamination, clean the apparatus moistly. When the switchboard has to be cleaned, separate it first from mains supply.

The chamber must always be kept clean. If necessary, wash it out, let off the cleanser liquid via the emptying valve (26) and rinse.

If the water of the chamber becomes turbid (to be seen at the water level glass (6)), it can be led off via the emptying valve (26) for the sterilizing chamber (1).

In case of calcareous water, the apparatus has to be decalcified once a year. These intervals can be extended when the sterilizing chamber is emptied regularly.

## 8.1. Sterilizer gasket

In course of time the sterilizer gasket (3) is subject to a natural wear and tear and has to be exchanged, if necessary, e.g. if it is deformed or damaged or if during sterilization steam escapes at the gasket.

To achieve a longer durability of the gasket (3) and to guarantee a safe tightening between chamber (1) and lid (2), the silicone gasket (3) must be controlled and maintained continuously. The gasket (3) must be removed from the gasket groove in regular intervals and be cleaned. As the grease loses its separating ability also when the unit is not used, the maintenance intervals depend not only on the frequency of use, but also on the blocking resistance of the chamber gasket.

Cleaning of the gasket (3) should be done when the unit is cold. For protecting the hands, the use of one-way rubber gloves is recommendable.

The gasket (3) is removed from the gasket groove (lid of the sterilizer open). Then the gasket has to be cleaned by a fluff-free cloth and afterwards to be checked, whether there are no wear and tear spots or damages. A defective or worn-out gasket has to be replaced.

Afterwards the gasket groove must be cleaned. For greasing the gasket, take a small quantity (approx. the size of a walnut) of grease on the palm of one hand and rub it between both palms, before you draw the gaskets through your hands. Then put the greased gasket back into the gasket groove.

The blocking resistance of the gasket must be checked before each setting into operation when the sterilizer is cold.

We recommend that you always dispose of spare gasket, as a defective gasket makes it impossible to operate the unit and causes an unnecessary stop.

## **9. Search for Errors**

### **9.1. Temperature indication does not work**

- sensor defective
- flowing obstructed
- condensate conductor defective

### **9.2. No pressure in the chamber**

- no water in the chamber
- no current / fuse defective
- water shortage protection disengaged

### **9.3. Chamber gasket leaky**

- gasket defective
- dirt on the gasket
- gasket has to be greased

## 10. Short Operating Instruktionen

for vertical autoclave KSG 30/50-1 - KSG 40/60-1 - KSG 50/70-1 KSG 50/80-1

**Operation of the unit acc. to the short operating instructions may only be done by persons who understood the operating instructions and are in a position to operate the unit accordingly.**

Fill the apparatus with distilled water until the maximum mark of water level indication.

Close the emptying valve for quick pressure reduction.

Load apparatus with goods to be sterilized and close lid.

Switch on the apparatus by ON/OFF switch (10).

Adjust the pressure at the pressure regulator (18).

Open the inlet valve for cooling water (24) correspondingly.

Measurement of sterilizing time by a clock.

After the sterilization open the Inlet valve for cooling water (24) and afterwards carefully the emptying valve (21) for quick pressure reduction.

When there is pressure equalization in the chamber (see Pressure gauge (25) for sterilizing chamber (1), open the function safety valve (7) at the operation lever (8).

Open the sterilizer lid (2) and swivel it to the top.

Close the Inlet valve for cooling water (24) and remove the goods from the chamber.

## 11. LEGEND

1	Sterilizing chamber
2	Sterilizer lid with swivel bow
2a	Operation handles for (2)
3	Gasket
4	Water level indication with protective covering
5	Water level valve, top
6	Water level valve, bottom
7	Function safety valves (with exhaust tube)
8	Operating lever for (7)
9	Switch box / electrical control case
10	ON/OFF switch / main switch
11	
12	Control lamp "heating" (yellow)
13	Control lamp "water shortage" (red)
14	
15	Temperature instrument
16	Contactator for (20)
17	Water shortage protected switch for (17a), resettable
17a	Water shortage sensor with micro radiator
18	Adjusting device for sterilizing pressure with regulation
19	Safety valve (with exhaust tube)
20	Plunger-type radiator (2x)
21	Emptying valve for rapid pressure release
22	Automatic condensate trap/Ventilator
23	Return flap - Stream
24	Inlet valve for cooling water
25	Pressure gauge for sterilizing chamber (1)
26	Emptying valve for sterilizing chamber (1)
27	Apparatus feet with fixation holes
28	Connection for cooling water
29	Connection to waste water (drain)
30	Cooler

### Remark:

All valves are in closed position when they are moved clockwise - seen on the operation handle - until the limit stop.









