behr
Labor-Technik

behrosog 3

Acid fume extractor

As an option,with Additional Cooling System (ACS)

201210

User‘s Manual

Please read this operating manual carefully before starting use of your new behrosog 3 scrubber!

The operating manual gives clear and simple instructions for use of the apparatus.

In the interests of eliminating risk please observe the safety instructions given in this manual!
They are marked with a ⚠ symbol.

Additional useful and important information on the functioning of the apparatus is marked by a stripe in the margin.

We wish you success in the use of the

behrosog 3 acid fume extractor

201210

Safety Warnings

Hazardous gas danger! Always conduct the Kjeldahl digestion in a fume hood or use a fume evacuator. We recommend operating the digestion unit and fume evacuator in a fume hood.

Danger of electrical shock! Take care that no liquids come in contact with the electrical cables or get inside of the apparatus! Before opening the apparatus hosing, always remove the electrical plug from the power line socket! Repair of electrical, electronic and mechanical systems within the unit must only be performed by authorized competent service technicians.

Be careful in working with corrosive substances! Follow the safety guidance in the pertinent Safety Data Sheets.

Glass can break and cause injury! In working with glass components, observe all appropriate safety precautions.

In the event that you are using the Additional Cooling System ACS: Cauton: risk of unforeseen reactions if different chemicals are mixed in the condensate bottle! Bottles may overheat and break. Empty the condensate bottle if you plan to switch between Kjeldahl digestion and other applications.

201210

Contents

201210

Scope of Delivery

Immediately on receipt, check the contents of the delivery for absence of damage and completeness.

A claim for damage in transport, which is evident on the outside of the packing, must be immediately submitted to the carrier (postal , rail or road haulage carrier) – see the shipping label on the package.

If components are damaged, but no damage to the external packing was evident (concealed transport damage), contact the behr customer service immediately (also in the event of other complaints). The address is:

behr Labor-Technik GmbH
Spangerstraße 8
40599 Düsseldorf
Phone: (+49 211) 7 48 47 17
Fax: (+49 211) 7 48 47 48
E-Mail: info@behr-labor.com

Please check the contents against the following list.

List of Components

- behrosog 3,
  pre-assembled with bottles , hoses and screwcaps
- Power cable for non-heating appliances

Optional:

Additional cooling system ACS, comprising:

- Stand
- Bottle
- Condenser
- Connection tube to the behrosog 3, acid-resistant
- Cooling water tubing
- Connecting pieces for the water supply

Appropriate Use

The behrosog 3 is used to extract and neutralize corrosive gases, primarily from Kjeldahl digestion systems used in the determination of nitrogen.

The information in this manual refers to the treatment of Kjeldahl digestion fumes. In the event that you contemplate using the behrosog 3 in conjunction with another reaction, please inform yourself which reagents and settings are necessary for this application. In this case, make certain that the bottles are properly labelled.

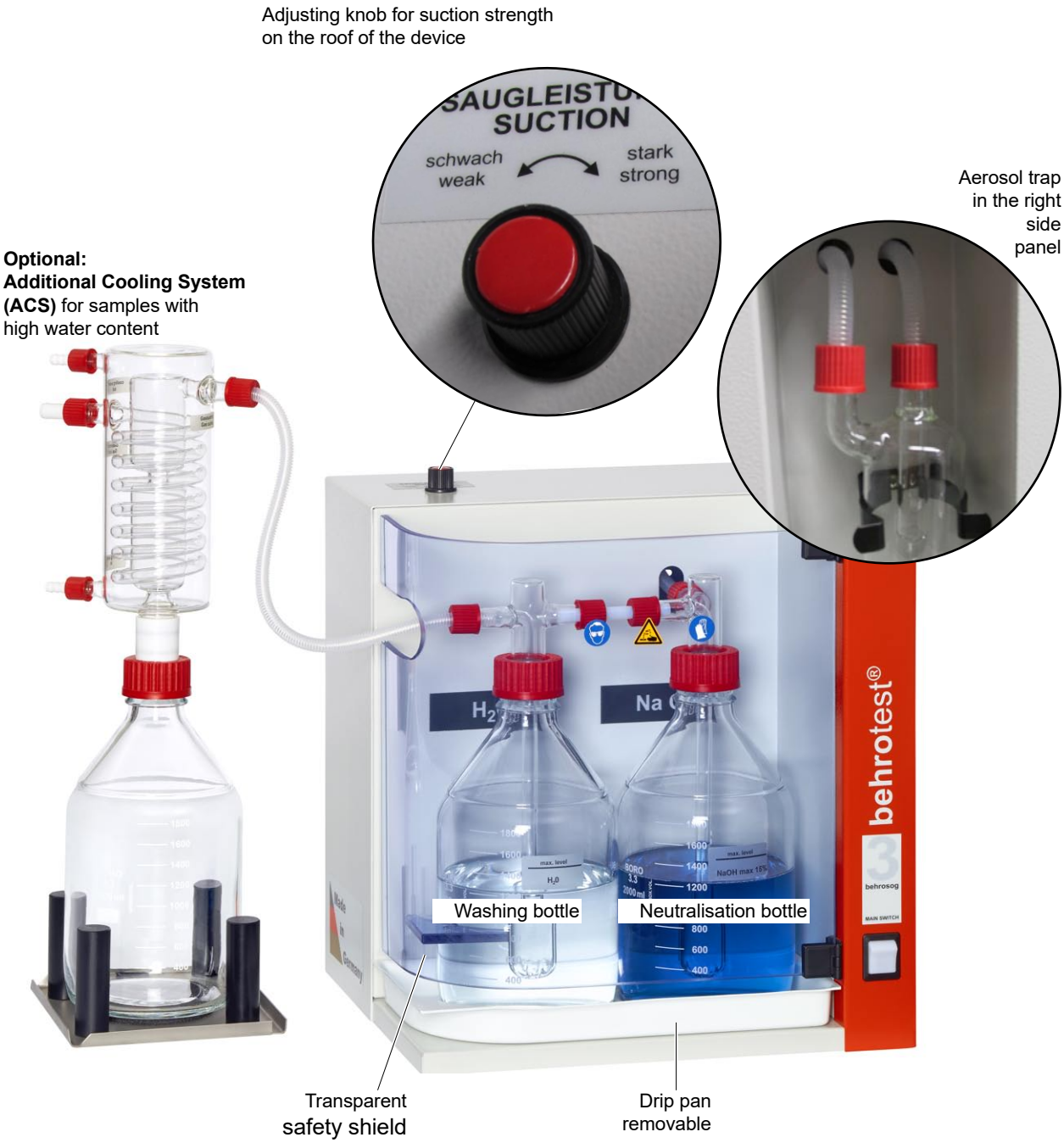
Do not make any arbitrary alterations in the unit. Such changes could adversely affect the safety or reliability of the behrosog 3 and will void the product guarantee.

Always operate the unit in accordance with the guidance provided in this manual.

We recommend that both digestion unit and behrosog 3 always be operated in a fume hood.

201210

Overview of the behrosog 3



How the behrosog 3 Works

Washing Bottle and Neutralization Bottle

The hot, acid fume gases are sucked through two big gas-washing bottles. The first one is filled with plain tap water;. it keeps back part of the acid and mainly serves to cool down the gas flow. The connectors of this bottle are designed such (with the outlet bigger than the inlet) as to prevent mixing them up.

The second bottle is filled with a diluted sodium hydroxide solution to neutralize the acid components of the fume gas. Due to the angular shape of the washing-bottle insert, this bottle can only bew connected in the correct direction.

Aerosol Trap

To prevent splashes of the washing solutions to be sucked into the suction pump, the gas flow is first passed through an aerosol trap bottle. It is situated in the right side panel of the device.

Drip Pan and Protection Door

The gas-washing bottles are placed in a drip pan behind a transparent protection door. Even if a connection should become leaky: it will all end up in the drip pan, nobody will be harmed.

Adjusting the Suction Strength

In the Kjeldahl digestion, the mixture of sulfuric acid, salts and the sample is heated to temperatures far over 300 °C. The sulfuric acid evaporated at these temperatures, however, should precipitate in the upper part of the digestion vessel; only the sulfur dioxide emerging from the digestion is to be sucked off. If large amounts of sulfuric acid are sucked off along with the fume gas, ammonia nitrogen will be lost.

How much gas needs to be sucked off will depend on the nature and number of your samples.

Therefore the suction strength of the behrosog 3 can be adjusted with a bypass valve. When opened (by turning the knob to the left) the pump will draw air from the exterior, thus diminishing the suction flow rate.

Option: Additional Cooling System ACS

With samples that contain much water, it is recommendable first to pass the exhaust gas through the condenser of the Additional Cooling System (ACS) to get rid of the bulk of the water befor the digestion really starts, and so to relieve the neutralization bottles of the big quantities of water.

It is not the job of the Additional Cooling System to recover the sulfuric acid of the Kjeldahl digestion. With the Kjeldahl digestion, sulfuric acid is used up for degradation of organic substance; in these reactions, the sulfuric acid itself is reduced to sulfur dioxide When all organic substance has been destroyed,there must still be sufficient sulfuric acid left to hold back the nitrogen as ammonium sulfate.

For spare parts, see the Spare Parts list on page 18 / 19.

201210

Setting the behrosog 3 Up

Glass can break and cause injury! In working with glass components, observe all appropriate safety precautions.

Although the behrosog 3 efficiently removes acid fumes from the Kjeldahl digestion, we nevertheless recommend operating both digestion unit and behrosog 3 in a fume hood.

The components of the behrosog 3 are shipped assembled as they are used in operation. You only need to remove the transport packing material, fill the bottles and connect the unit.

- Remove the behrosog 3 from the packing and place it next to your digestion unit in the fume hood.
- Insert the device power cable connection into the socket on the rear of the behrosog 3.
- Plug the power line plug into an electrical power socket.

You can attach a hose to the outlet connection to run the exhaust into the exhaust duct of the fume hood. If you do so, make sure the hose is free and does not get squeezed. If the exhaust hose gets squeezed, this may destroy the pump.


Mains socket

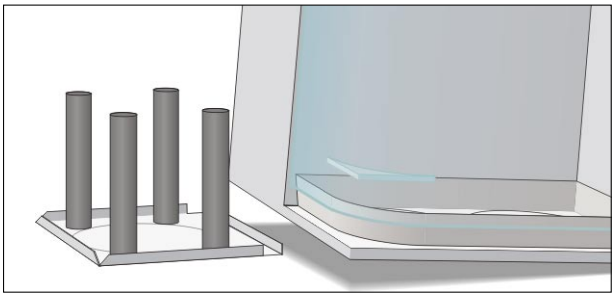
Installing the Additional Cooling System (ACS, optional)

Caution: the Additional Cooling System might topple! Attach the base plate of the ACS to the base unit as described here. Only then set up the condensate flask and the cooler.

Attaching the base plate

The base plate of the ACS can be hooked under the edge of the housing of the base unit with its bent-up rim. Thus the housing will hold the base plate down, and the cooling system cannot topple.

- Lift the behrosog 3 housing a little on its left side.
- Push the long side of the base plate under the edge of the behrosog 3 housing.
- Let the housing come down on the base plate. Make sure the base plate engages properly in the housing; if it doesn't, lift the housing again and adjust the position of the base plate.



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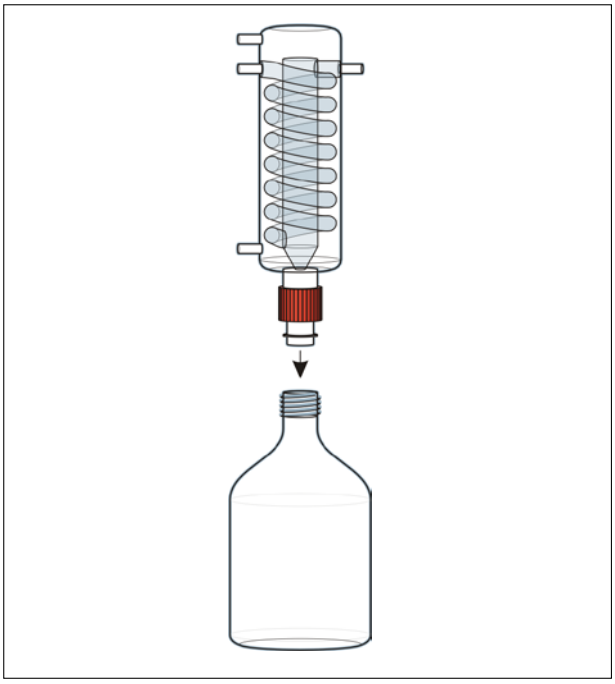
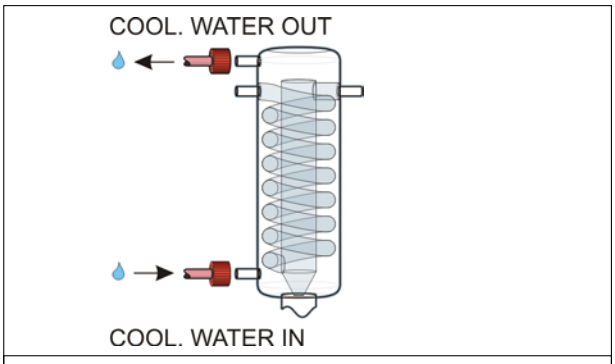
Inserting Condensate Flask and Condenserer

- Place the condensate flask between the columns.
- Place the cooler nozzle on the condensate flask.
- Fasten the cooler by tightening the sleeve nut.



Cooling Water Supply for the ACS

- Connect the cooling water inlet hose to the lower nozzle of the cooler (labelled “Cooling Water In”) and connect the other end to the water tap or to the outlet of your pumparound cooler.
- Connect the cooling water outlet tube to the uppermost nozzle (labelled “Cooling Water Out”) on the same side of the cooler and run it to the sink or to the inlet of your pumparound cooler.



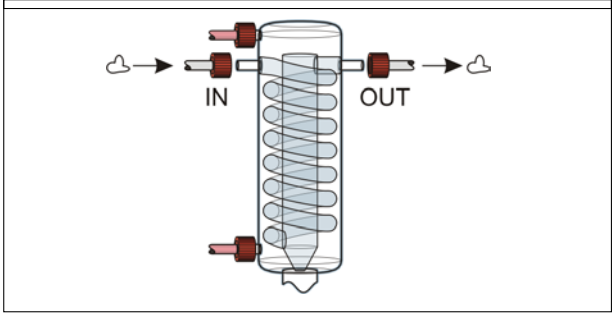
Exhaust Gas Hoses

Make sure to connect the tubing properly. The gas inlet nozzle leads to the cooling coil, the outlet nozzle is connected to the inner vessel. By this flow direction, condensate forming in the cooling coil will be blown down into the condensate flask, rather than blown out of the cooler.

On delivery, the connector for the suction hose is mounted on the gas inlet nozzle of the first-stage scrubber bottle.

- Deconnect the hose connector from the gas inlet nozzle of the first-stage scrubber bottle, and screw it on the gas-inlet nozzle of the cooler. It is the nozzle right below the cooling-water outlet nozzle, it is labelled IN.
- Attach the suction hose of your fume collector to this hose connector.
- Connect the connecting tube to the gas outlet nozzle of the cooler. You find it on the other side of the cooler, right opposite to the gas inlet nozzle.

The other end of the connecting tube will be connected to the inlet nozzle of the first-stage scrubbe bottle - see the following pages.



Filling the Bottles

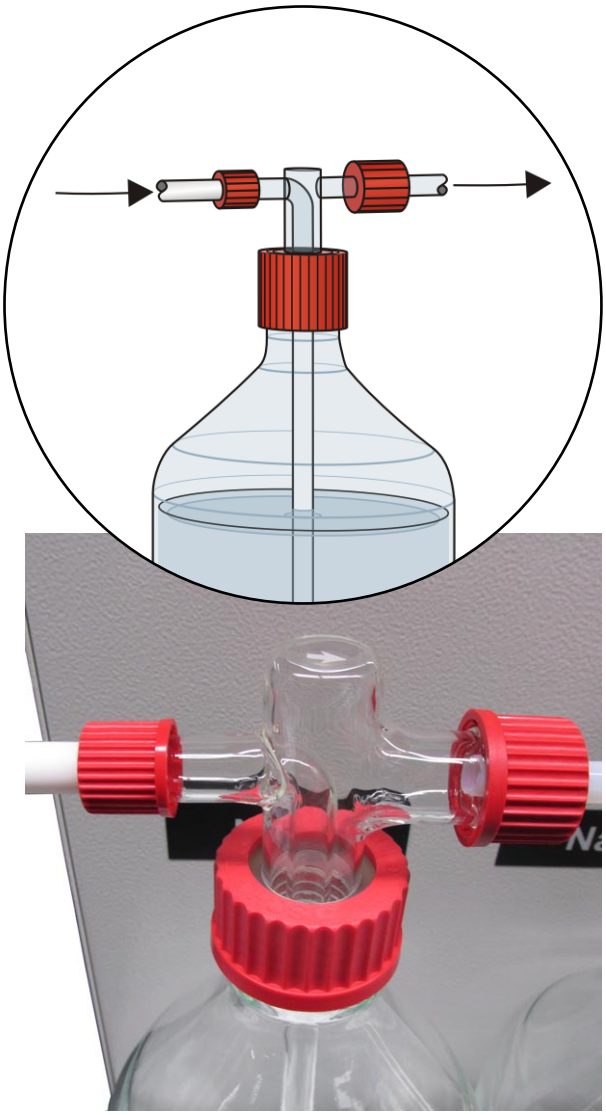
Glass can break and cause injury! In working with glass components, observe all appropriate safety precautions.

Be careful in working with corrosive substances! Follow the safety guidance in the pertinent Safety Data Sheets.

Caution: if you confuse the inlet and outlet nozzles of the scrubber bottles, scrubbing solution (NaOH solution) will be sucked into the pump and squirted out. It could damage the device and burn you. Make sure always to connect the bottles as shown here.

Now you just have to fill the bottles and the behrosog 3 will be ready for your sample digestion.

- If it is a new device you are taking into service: Remove the protective plastic foil.
- Open the protective door.
- Separate the screw connection between the two bottles and take the first stage scrubber bottle out of the apparatus.
- Remove the screw cap from the first-stage scrubber bottle.
- Remove the washing-bottle insert from the first-stage scrubber bottle and lay it aside.
- Fill the first stage scrubber bottle approximately half full with tap water.
- Insert the washing-bottle insert back into the bottle and fasten the screw cap tightly.
- Replace the first stage scrubber bottle in place at the left on the drip pan. Rotate the bottle so that the connection leading to the washing-bottle insert is pointing to the left.



- Remove the screw cap from the neutralization bottle.
- Remove the washing-bottle insert from the neutralization bottle and lay it aside.

- Fill the neutralization bottle approximately half full with neutralization solution. For the Kjeldahl and aqua regia heavy metal digestions in which acid fumes are produced, a 10% sodium hydroxide solution is suitable.

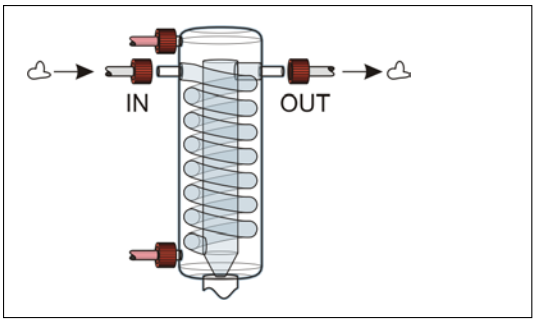
  If you add a suitable indicator to the neutralization solution (say, bromothymol blue), you will be able to see when the neutralization reagent is exhausted.
- Insert the washing-bottle insert back into the bottle and fasten the screw cap tightly.
- Place the neutralization bottle on the right side of the drip pan. Turn it so that the connection leading to the washing-bottle insert is oriented to the left, towards the first stage scrubber bottle. The other connection is then oriented towards the rear.
- Retighten the screw connections.

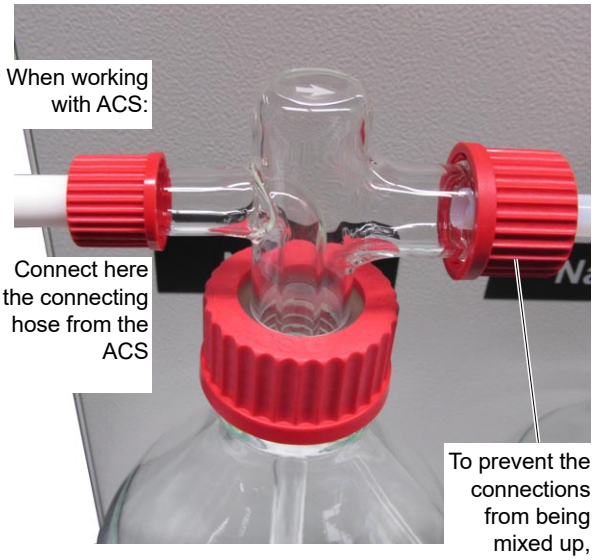
If you are working with the additional cooling system ACS:

- Connect the connecting hose to the left hose connection of the first stage scrubber bottle.

  You have already connected the other end of that hose to the gas outlet of the ACS cooler.

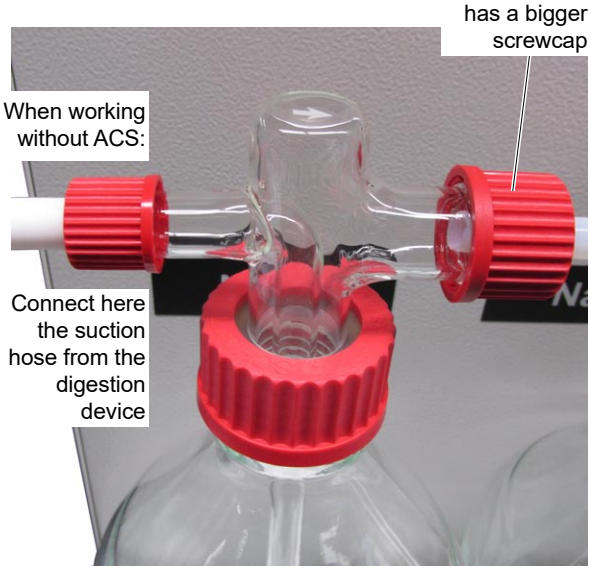
- Verify that all connections have been properly made and that the screw connections are tight.





If you are working without the additional cooling system ACS:

- Connect the suction hose to the left hose connection of the first stage scrubber bottle.
- Connect the other end of the suction hose to the exhaust collector.
- Verify that all connections have been properly made and that the screw connections are tight.



Now the behrosog 3 is ready for use.

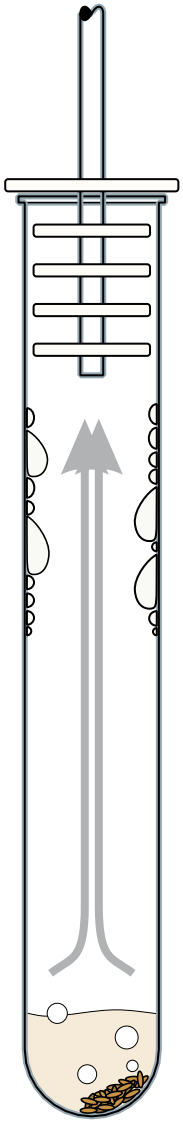
Fume Extraction

As an example of the use of the behrosog 3 a procedure is described which has proved practical in the analysis of animal feed.

Which settigs are needed - for your digestion device as well as for the fume extraction - depends on your kind of digestion device (heating block or infrared digestion unit), on the digestion procedure and on the nature of the sample. Ask your behr customer service for application

- If necessary, heat the digestion device up.
- Insert the sample vessels into the sample rack and place the fume manifold on the sample rack.
- Turn the behrosog 3 on by means of the On/Off switch.
- Turn the adjusting knob for suction strength in “strong” direction as far as possible.

The adjusting knob operates a valve. You can screw it in for several turns. No worry if you have turned the valve cone loose. Just put it in again and turn it right until it fits into the thread.



- If you are working with ACS: open the cooling-water tap.
- Lower the sample rack with the samples into the digestion device with the fume manifold placed on the sample rack.
- After about 10 minutes, when formation of fumes has slowed down, lower the suction strength by turning the adjusting knob somewhat counter-clockwise. Reduce the suction strength so that the acid vapors basically remain in the exhaust collector and a condensation zone forms in the upper third of the sample vessels.

If you do not sufficiently reduce the suction strength, too much sulphuric acid will be lost and then consequently also ammonia, leading to low analysis results.

- Leave the behrosog 3 in operation during the time that the samples are cooling after digestion with the exhaust collector in place on the sample vessels.
- After the samples have cooled down (about 10 – 20 min.), remove the fume manifold from the sample vessels. Now turn the behrosog 3 off.

201210

Before the Next Use

Glass can break and cause injury! In working with glass components, observe all appropriate safety precautions.

Be careful in working with corrosive substances! Follow the safety guidance in the pertinent Safety Data Sheets.

Before you begin work with the behrosog 3 in the morning, check the bottles and the aerosol trap.

Condensate bottle

Caution: sulphuric acid in the condensate bottle! Follow the safety guidance in the pertinent Safety Data Sheets.

Cauton: risk of unforeseen reactions if different chemicals are mixed in the condensate bottle! Empty the condensate bottle whenever changing between different digestion methods.

When so much liquid has condensed in the condensate bottle that the level has reached the “max.” line, then empty the bottle.

Also empty the condensate bottle whenever you change between different digestion methods.

After Kjeldahl digestions, the condensate bottle will contain a mixture of water, sulphuric acid and sulphurous acid, possibly with still other components. Dispose of the contents appropriately.

First-Stage Scrubber Bottle

Be careful! There is sulfuric acid in the first stage scrubber bottle. Follow the safety guidance in the pertinent Safety Data Sheets.

When so much liquid has condensed in the first-stage scrubber bottle that the level has reached the “max.” line, then dispose of the contents and refill the bottle again with water. Follow the procedure described in the section entitled “Filling the Bottles.”

Neutralization Bottle

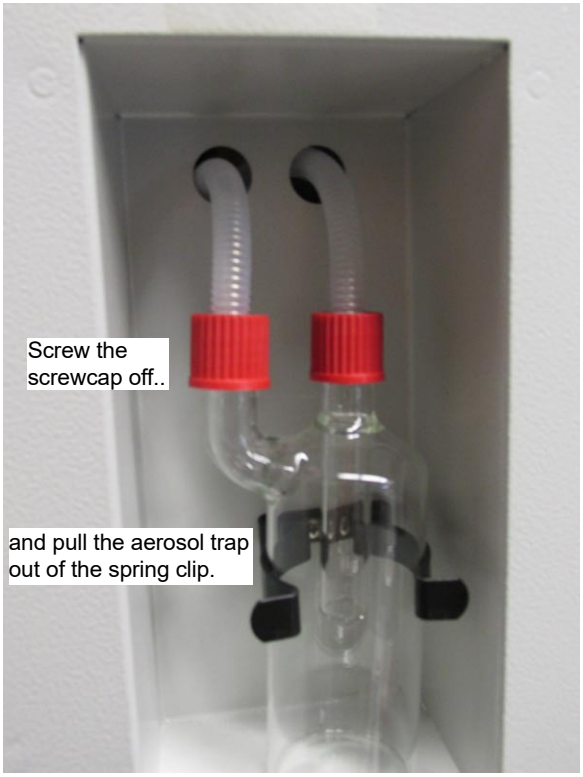
Be careful in working with sodium hydroxide! Follow the safety guidance in the pertinent Safety Data Sheets.

Check to insure that the contents of the neutralization bottle remains strongly alkaline. If the sodium hydroxide is nearly neutralized, then refill the bottle. Proceed as described in the section entitled “Filling the Bottles.”

Aerosol Trap

Check to see whether liquid has accumulated in the aerosol trap. If it has, empty the trap.

- Remove the screw caps on the inlet and outlet tubes.
- Remove the aerosol trap from its mounting.
- Empty the aerosol trap.
- Replace the aerosol trap in the mounting.
- Attach the inlet and outlet tubes again by means of the screw caps.



Care and Maintenance

Glass can break and cause injury! In working with glass components, observe all appropriate safety precautions.

Be careful in working with corrosive substances! Follow the safety guidance in the pertinent Safety Data Sheets.

Danger of electrical shock! Take care that no liquids come in contact with the electrical cables or get inside of the apparatus! Before opening the apparatus hosing, always remove the electrical plug from the power line socket! Repair of electrical, electronic and mechanical systems within the unit must only be performed by authorized competent service technicians.

The housing surface of the behrosog 3 is not easily damaged and is acid-resistant. Nevertheless, do not use any aggressive cleaning agents on it.

Clean the drip pan regularly and empty the aerosol trap (see previous page).

The sealed portion of the housing contains no components requiring maintenance. In event of malfunction, contact the behr Customer Service Support.

Tubings Inside the Device

Check regularly – at least once per year – that the hoses and hose connections inside the device are still keeping tight.

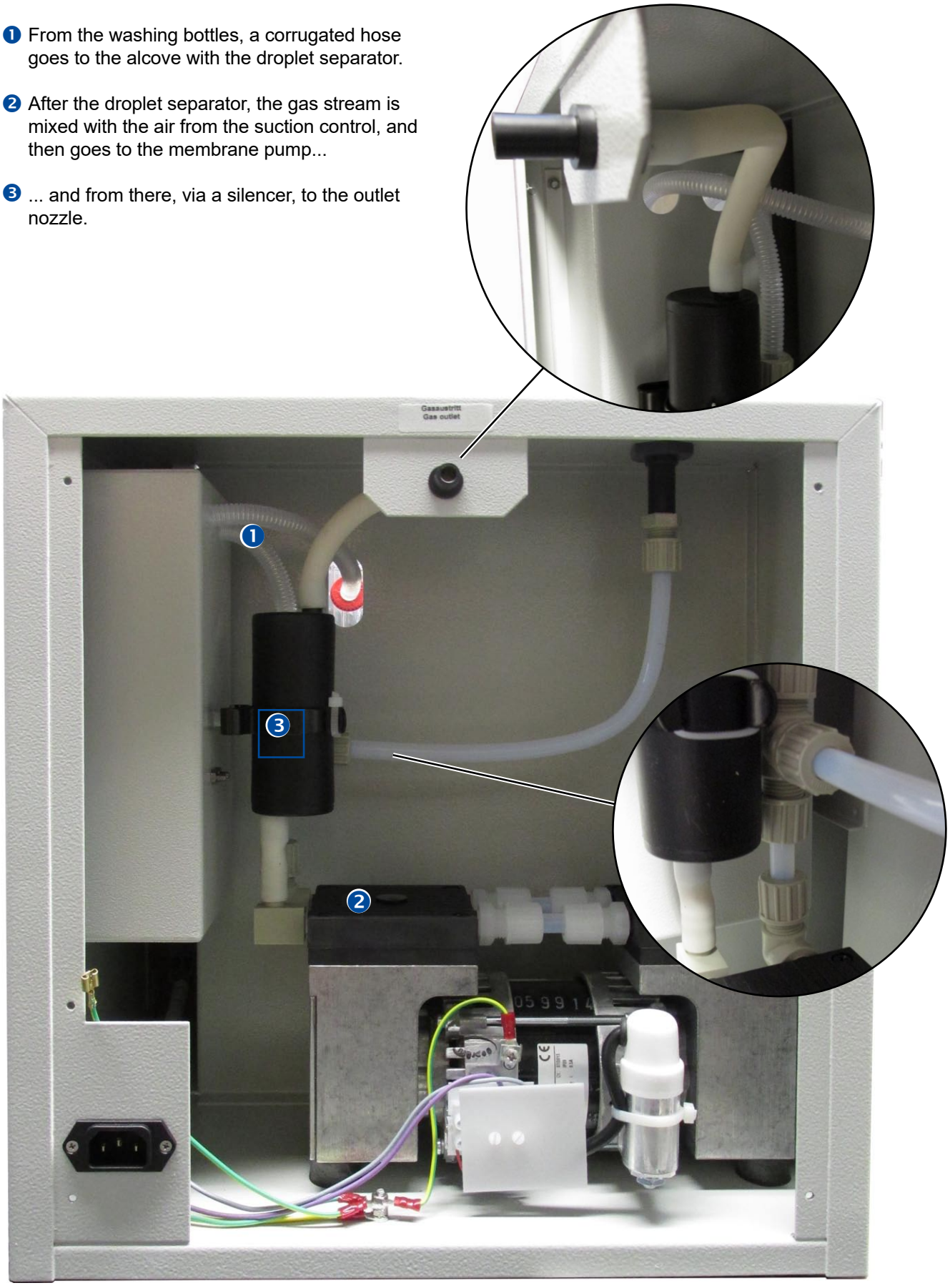
In order to take off the rear panel,

- pull the main switch,
- remove the exhaust hose from the nozzle on the upper side of the rear panel,
- and undo the six screws that are holding the rear panel..
- Now be careful taking off the rear panel; it is still connected to the device by a ground connector.
- Pull the ground connector off and lay the rear panel aside.

Don‘t forget to put the ground connector on again when remounting the rear panel.

Looking into the inside of the behrosog 3 you can follow the way the gas goes, from the gas-washing bottles right to the exhaust outlet nozzle.

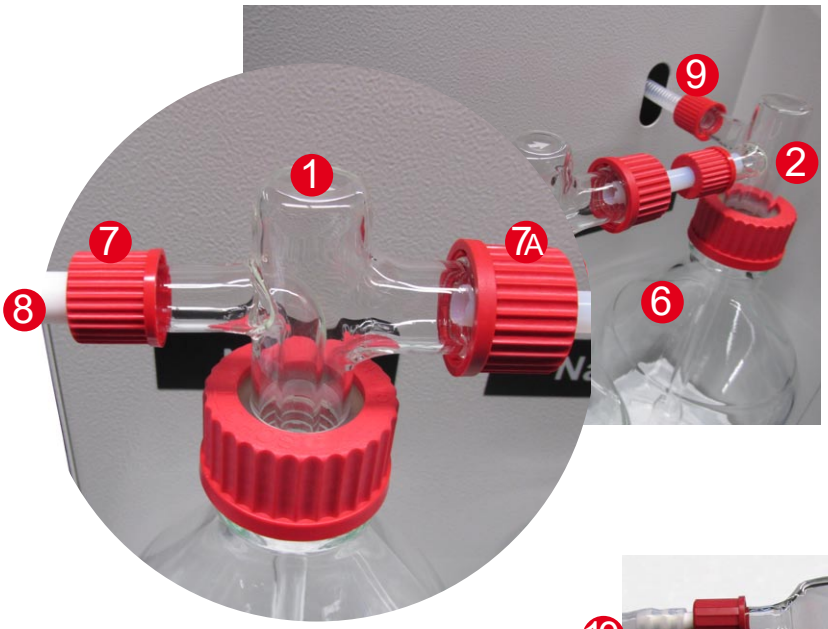
1. From the washing bottles, a corrugated hose goes to the alcove with the droplet separator.
2. After the droplet separator, the gas stream is mixed with the air from the suction control, and then goes to the membrane pump...
3. ... and from there, via a silencer, to the outlet nozzle.

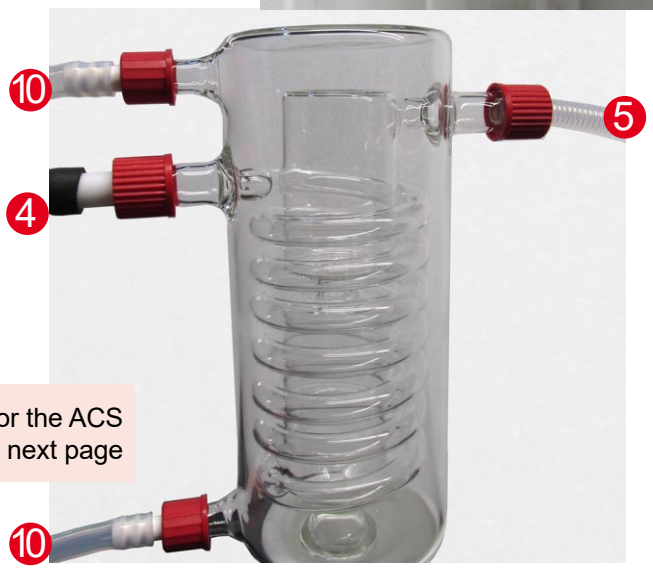


201210

Spare Parts and Consumables

	Description	Art. No.
	Glass bottle with GL45 threading	B00225419
1	Washing-bottle insert, with straight nozzles GL14 for inlet, GL25 for outlet (for first-stage scrubber bottle)	B00682436
2	Washing-bottle insert, with angular nozzles (for neutralization bottle)	B00231891
3	Aerosol trap bottle	B00231892
4	Suction hose (per metre)	B00224985
5	Connecting hose ACS - behrosog 3 (per metre)	B00225037
6	PTFE Connecting hose first-stage bottle - neutralization bottle, per metre	B00224974
7	Screwcap on the inlet of behrosog 3 for PTFE nozzle	B00230856
8	PTFE nozzle on the inlet of behrosog 3	B00230855
7A	Screwcap on the outlet of the first-stage washing bottle, GL25, without gasket ring	B00226048
	Silicone gasket ring 22x10 mm for the GL25 screwcap	B00226046
9	Screwcaps for the other bottle connections and for aerosol trap	B00226041
	Silicone gasket ring for the other screwcaps (GL18)	B00226042





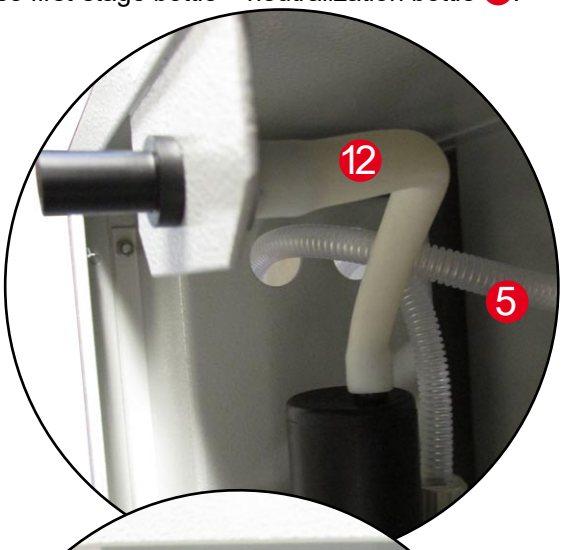
Spare parts for the ACS
see next page

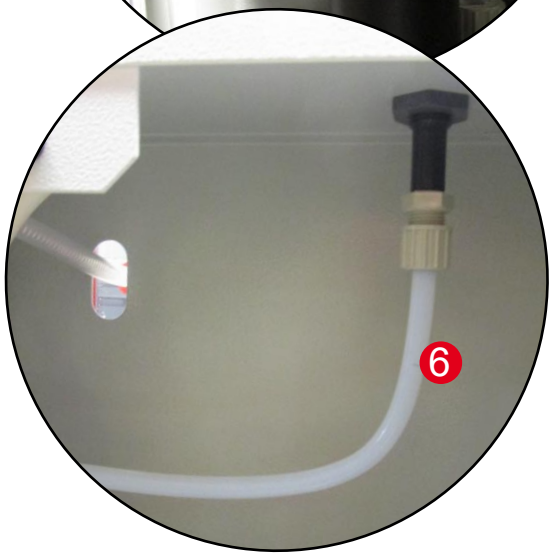
201210

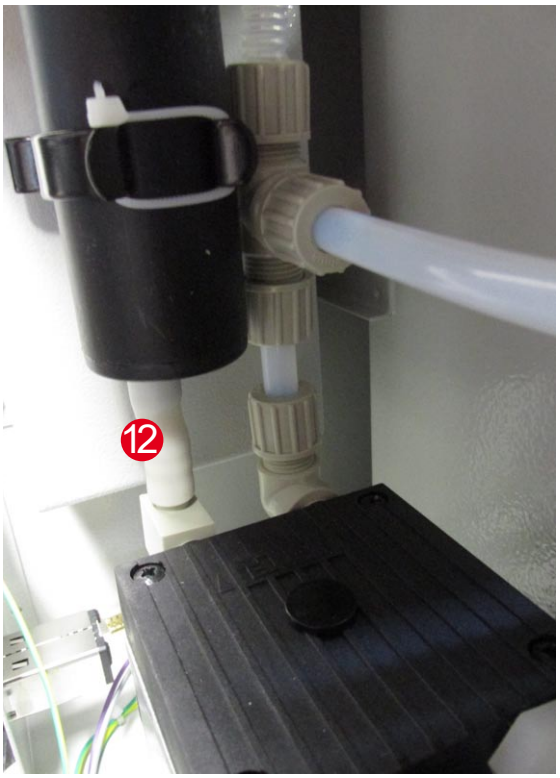
Spare Parts Inside the Device

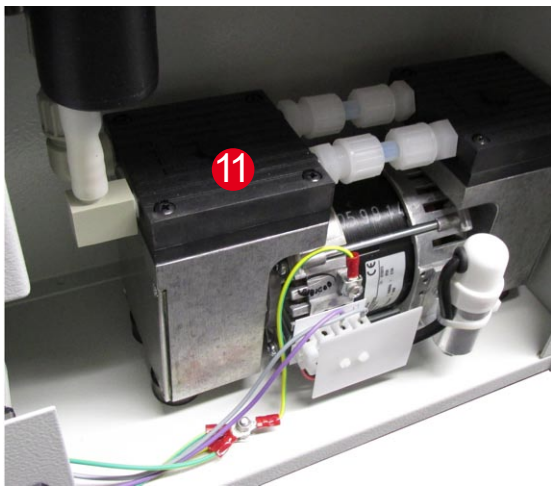
	Description	Art. No.
11	Membrane pump, including silencer and condenser	B00637677
12	TPE hose (leading to the exhaust outlet) per meter	B00225004

The hose to the droplet separator and from it is the same as the connecting hose from the ACS (B 0022 5037) 5. The hose coming from the bypass valve is made of PTFE and subject to very little wear and tear; it is the same as the connecting hose first-stage bottle – neutralization bottle 6.









Spare Parts for the ACS:

	Description	Art. No.
	ACS complete	B00217927
	Condensate bottle for ACS	B00225419
	Condenser for ACS	B00231887
10	Silicone tube 6 x 2 mm (cooling-water hose for the ACS)	B00224981
	Hose connecting set (for water supply 1/2¨ or 3/4¨)	B00232955
	Tube plug bolt 8 mm (adapter from hose connecting set to cooling-water hose)	B00226062

Technical Specifications

Dimensions: (WxHxD) in mm, approx	380 x 400 x 340
Weight in kg, approx.	18
Pump delivery rate	max. 40 l/min under conditions of no backpressure
Line Voltage	230 V~ / 50 Hz
Power consumption max.	80 W

Service Support

In the event of a malfunction or defect in your behrosog 3, contact:

behr Labor-Technik GmbH Spangerstraße 8 D-40599 Düsseldorf	Telephone Service telephone Replacement parts: Fax: E-Mail:	 (+49 211) 7 48 47 40 (+49 211) 7 48 47 17 (+49 211) 7 48 47 48 info@behr-labor.com

201210

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